

DRAFT PDS-03

***Proposed Addendum BSR/RESNET/ICC 301-2014
Addendum F-201x, Normative Appendix A***

The changes to Draft PDS-02 of proposed Addendum F are shown in red text with strike-through for deleted language and underline for added language. Modify Draft PDS-02 as follows.

Revise the following sections of Standard ANSI/RESNET/ICC 301-2014:

4.2.2.2. Insulation Inspections: All enclosure elements for the Rated Home shall have their insulation assessed in accordance with this Standard. ~~Installed cavity insulation~~ shall be rated as Grade I, II, ~~or III,~~ or uninsulated in accordance with the on-site inspection procedures equivalent to Normative Appendix A.

4.2.2.2.1. The insulation of the Energy Rating Reference Home enclosure elements shall be modeled as Grade I. The insulation of the Rated Home shall either be inspected according to procedures equivalent to Normative Appendix A or, if confirmed to be present but not fully inspected, shall be modeled as Grade III and shall be recorded as “not inspected” in the rating.

Thermographic inspection is permitted to be used to determine that an assembly is insulated and achieves a Grade II rating if the person doing the inspection is an ASNT NDT Level III or a licensed engineer, or if the person doing the inspection is working under the direction of an ASNT NDT Level III or a licensed engineer. Thermographic inspection shall not be used to determine an assembly achieves a Grade I rating.

Add the following definition to Standard ANSI/RESNET/ICC 301-2014:

Insulated Sheathing – An insulating board with a core material having a minimum R-value of R-2.

Modify proposed Normative Appendix A:

Normative Appendix A

A-1. Insulation

In order to meet the requirements of a Grade I or Grade II insulation rating, the insulation material shall be installed in accordance with the minimum installation requirements of this Appendix and the requirements specified by ASTM standards C727, C1015, C1743, C1320, and C1321 ASTM C1848 as described below in the Insulation Grading section.

Installations not complying with the minimum installation requirements of this Appendix, the relevant ASTM standard for the type insulation, or not the Grade I or Grade II coverage requirements shall be considered Grade III installations. Grade III installations shall be recorded and shall be modeled as specified by Section 4.2.2.2.2 of this Standard.

A-1.1 Minimum General Installation Requirements:

1. Insulation shall be installed to manufacturers' recommendations.
2. ~~Insulation shall be integral to or on the interior or exterior side and in substantial and~~

~~permanent contact with the primary air barrier.~~

3. No air spaces shall be allowed between different insulation types or systems.

Exception: When claiming the R-value of an enclosed reflective air space in accordance with [the ASHRAE Handbook of Fundamentals, Chapter 26, table 3](#) or the ASHRAE 90.1-2016 Section A9-4 (or addendum ac to the 2013 edition) or ASTM C 1224.

4. Insulation shall be installed to the required density and thickness necessary to achieve the labeled R-value.
5. Insulation shall fill around obstructions including, but not limited to, framing, blocking, wiring, pipes, etc. without substantial gaps or voids.

A-1.2 Minimum Specific Application Requirements:

1. Insulation installed in framed floor assemblies shall be in substantial and permanent contact with the subfloor.

Exception: The floor framing-cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing where combined with insulation that meets or exceeds the minimum wood frame wall R-value in Table 402.1.2 of the ~~2015~~-International Energy Conservation Code (IECC) and that extends from the bottom to the top of all perimeter floor framing members.

The cavity insulation between floor joists, beams or other horizontal floor supports that create cavities under the subfloor shall be permitted to be in direct contact with any additional continuous insulation attached to the underside of the horizontal supports. The combination of both cavity and continuous insulation shall meet or exceed the minimum required floor R value in [Table](#) 402.1.2 of the ~~2015~~-International Energy Conservation Code, (IECC). Instances of reflective insulation system installed beneath hydronic floors are not required to meet this standard.

2. For rim or band joist applications, insulation shall be in substantial and permanent contact with rim or band joist framing and tightly fitted to intersecting solid floor joists, ~~wood i-~~ ~~joists~~ or extend continuously through open web floor trusses; interior sheathing or air barrier is not required provided there is an air barrier on the exterior side or the insulation material is installed as an air barrier material.
3. Air permeable insulation installed in ventilated attics and vented sloped roofs shall have an effective air barrier (wind block, air chute, or eave baffle) securely fastened and installed at the eave or soffit edge vent of every cavity. The effective air barrier shall extend up and beyond the surface of the insulation or to the ridge vent.

A-1.3 Minimum Specific Material Requirements:

A-1.3.1 Insulated Sheathing:

1. If used as an air barrier, edges and joints shall be taped or otherwise air sealed in accordance with the manufacturer's recommendations.
2. Edges not supported directly on sheathing or framing shall be tightly fitted to one another without substantial gaps.
3. Sheathing shall be carefully fitted and taped or otherwise air sealed around obstructions in accordance with the manufacturer's recommendations.
4. When two or more layers of insulation are installed the joints shall be staggered. Only the joints of one of the layers shall be required to be taped or otherwise air sealed

where that layer is designated to be an air-barrier.

5. Where used as an approved water-resistive barrier (WRB), sheathing joints, fenestration, and service penetrations shall be taped or otherwise air sealed in accordance with the manufacturer's installation instructions.

A-1.3.2 Fibrous Batt Insulation:

1. Insulation shall fill the cavity being insulated side to side, top to bottom.
2. Insulation shall be enclosed on all six sides with an air barrier.

Exceptions:

- a. Insulation installed in attics above ceilings shall not require an air barrier on the exterior side.
 - b. Insulation installed under floors directly above an unvented crawl space shall not require an air barrier on the exterior side.
 - c. Insulation installed in rim or band joists located in conditioned space shall not require an air barrier on the interior side.
 - d. Insulation installed on conditioned basement and crawlspace walls where an air barrier material meeting code requirements for exposed applications and tested in accordance with ASTM E2178 is installed on the interior side.
3. Faced batts shall be stapled to the face of the studs or side stapled to the studs with no buckling of the stapling tabs or the tabs shall be permitted to be left unstapled. ~~Inset or side stapling of batt insulation shall not be permitted for Grade I installations.~~ Faced batt products without tabs and friction fit products shall not be required to be stapled when installed in ~~vertical~~ walls. When batts are face stapled, verify batts are not pinched, hiding the compression.
 4. When side stapled, compression is permitted only along edges to the depth of the stapling tab.
 5. Insulation shall be closely fitted around obstructions including, but not limited to, framing, blocking, wiring, pipes, etc. to avoid substantial gaps, voids or compression.

A-1.3.3 Blown or Sprayed Fibrous Loose Fill Insulation:

1. Insulation containment fabric or system that is side stapled shall not be stapled more than ½ inch back from the face of the stud.
2. Insulation shall be rolled or trimmed flat to allow installation and contact with interior sheathing or finish material.
3. Insulation shall fill the cavity being insulated, side to side, and top to bottom.
4. Blown insulation shall meet the manufacturer's stated recommendations for density and coverage in order to meet the required R value and to minimize or prevent settling.
5. Insulation shall be enclosed on all six sides with an air barrier.

Exceptions:

- a. Air permeable insulation installed on the top side of the ceiling in unconditioned attics shall not require an air barrier on the exterior.
 - b. Insulation installed under floors that are directly above an unvented crawl space shall not require an air barrier on the exterior side.
 - c. Insulation installed in rim or band joists located in conditioned space shall not require an air barrier on the interior side.
6. Insulation shall be installed around obstructions including, but not limited to, framing, blocking, wiring, pipes, etc. as to avoid substantial gaps, voids or compression.

A-1.3.4 Open cell spray polyurethane foam (SPF) insulation:

1. Installers shall meet the manufacturer's recommended training requirements and shall complete the online health and safety training for SPF provided by the Center for Polyurethanes Industry.
2. Spray foam shall be well-bonded to the substrate, including framing and sheathing.
3. Insulation, installed at a minimum thickness to be air impermeable per E2178 (air permeance less than 0.04 cfm/ft²) and in-contact with the substrate shall be permitted to serve as the air barrier.
4. When insulation extends beyond the wall cavity it shall be trimmed to allow installation and contact with interior sheathing or finish material.
5. Insulation shall fill the cavity to within ~~no more than~~ at least ½ inch ~~from of~~ the face of the studs.

Exception: The cavity fill requirement is met ~~When~~ the required R-value is met/achieved using a thickness that is less than the cavity depth.

A-1.3.6 Closed-cell spray polyurethane foam (SPF) insulation:

~~1.~~ Installers shall meet the manufacturer's recommended training requirements and shall complete the online health and safety training for SPF provided by the Center for Polyurethanes Industry.

1. Spray foam shall be well-bonded to the substrate, including framing and sheathing.
2. Closed-cell Insulation, installed at a minimum thickness of 1.5 inches and in-contact with the substrate, shall be permitted to serve as the primary air barrier. Installed at thicknesses of 1.5 inches thick or more shall be permitted to be an air-impermeable insulation when in-contact with the substrate.

Exception: Thicknesses less than 1.5 inches considered air-impermeable with appropriate ASTM E2178 data (air permeance less than 0.04 cfm/ft²) from manufacturer data sheet or code evaluation report prepared by an organization accredited for product certification per ISO-17065 or other source approved by an authority having jurisdiction ~~or approved source~~.

A-2.0 Insulation Grading

A-2.1 Grading Criteria for Batt, Loose-fill, Open and Closed Cell Polyurethane Spray Foam Insulation and Insulated Sheathing

A-2.1.1 Grade I (Minor Defects)

Shall meet ASTM-specified installation requirements in the applicable standards C1015, ~~and C1320 and ASTM C1848~~, and shall ~~also~~ meet the following ~~cavity fill appropriate material installation grading~~ requirements:

A-2.1.1.1 Batt or Loose-fill Insulation

When installing batt, or loose-fill insulation, no more than 2% of the total insulated area ~~(cavity)~~ shall be compressed below the thickness required to attain the labeled R-value or contain gaps or voids in the insulation. These areas shall not be ~~missing or~~ compressed more than 3/4 inch of the specified insulation thickness in any given location. Voids extending from the interior to exterior of the intended insulation areas shall not be permitted.

A-2.1.1.2 Open-Cell Polyurethane Spray Foam Insulation (cavity not filled and not trimmed)

When installing open-cell polyurethane spray foam the average of all thickness measurements shall be greater than the specified thickness required to obtain the specified R-value. No more than 2% of the insulated area shall contain voids or be more

than ¾ inch below the specified thickness. The minimum installed thickness shall not be less than 1 inch below the specified thickness at any point. Voids extending from the interior to the exterior of the intended insulation areas shall not be permitted.

A-2.1.1.3 Open-Cell Polyurethane Spray Foam Insulation (cavity filled and trimmed)
When installing open-cell polyurethane spray foam, no more than 2% of the total insulated area (cavity) shall be below the thickness required to attain the specified thickness, or contain gaps or voids in the insulation. The minimum installed thickness shall not be less than 1/2 inch below the specified thickness at any point. Voids extending from the interior to exterior of the intended insulation areas shall not be permitted.

A-2.1.1.34 Closed-Cell Polyurethane Spray Foam

When installing closed-cell polyurethane spray foam the average of all thickness measurements shall be greater than the specified thickness required to obtain the specified R-value. No more than 2% of the insulated area shall contain voids or be greater than ½ inch less than the specified thickness. The minimum installed thickness shall not be less than ¾ inch below the specified thickness at any point. Voids extending from the interior to exterior of the intended insulation areas shall not be permitted.

A-2.1.1.45 Insulated Sheathing

Insulated sheathing insulation installations meeting the minimum installation, application, and material requirements above. Voids exceeding 1/8" through interior to exterior of the intended insulation areas shall not be permitted. Joints and other gaps or separations in sheathing used as an air barrier, vapor retarder or drainage plane shall be taped or sealed.

A-2.1.2 Grade II (Moderate Defects)

Shall meet ASTM-specified installation requirements in ASTM standards C1015 and C1320 and ASTM C1848, and shall ~~also~~ meet the following cavity fill appropriate material installation grading requirements:

A-2.1.2.1 Batt or Loose-fill Insulation

When installing batt, or loose-fill insulation, no more than 15% of the total insulated area (cavity) shall be compressed or contain gaps or voids in the insulation. These areas shall not be missing or compressed more than ¾ inch of the specified insulation thickness in any given location. Inset staples are allowed for batt insulation. Voids through interior to exterior of the intended insulation areas shall not be permitted.

A-2.1.2.2 Open-Cell Polyurethane Spray Foam Insulation (cavity not filled and not trimmed)

When installing open-cell polyurethane spray foam the average of all thickness measurements shall be greater than the specified thickness required to obtain the specified R-value. No more than 15% of the insulated area shall contain voids. The minimum thickness shall not be less than ¾ inch below the specified thickness at any point. Voids extending from the interior to the exterior of the intended insulation areas shall not be permitted.

A-2.1.2.3 Open-Cell Polyurethane Spray Foam Insulation (cavity filled and trimmed)
When installing open-cell polyurethane spray foam, no more than 15% of the total insulated area (cavity) shall be below the thickness required to attain the specified thickness, or contain gaps or voids in the insulation. The minimum installed thickness shall not be less than 1/2 inch below the specified thickness at any point. Voids extending from the interior to exterior of the intended insulation areas shall not be permitted.

A-2.1.2.34 Closed-Cell Polyurethane Spray Foam

When installing closed-cell polyurethane spray foam the average of all thickness measurements shall be greater than the specified thickness required to obtain the

measurements shall be greater than the specified thickness required to obtain the specified R-value. No more than 15% of the insulated area shall contain voids. The minimum thickness shall not be less than 3/4 inch below the specified thickness at any point. Voids extending from the interior to exterior of the intended insulation areas shall not be permitted.

A-2.1.3 Grade III (Substantial Defects)

Installations not complying with the minimum installation requirements in ASTM standards C1015, ~~and C1320 and C1848~~, and ~~the appropriate~~ Grade I or Grade II ~~cavity~~ ~~fit~~ ~~material installation grading~~ requirements shall be considered a Grade III installation.

Grade III installations shall be recorded and shall be modeled as specified by Section 4.2.2.2.2 of this Standard.

A-2.2 Structural Insulated Panels (SIPs) Grading Criteria

1. Sealing of panel joints shall meet the manufacturer's ~~recommended~~ requirements ~~regarding the use of mastics and/or expanding foam~~. ~~Whereif~~ the manufacturer does not have specific joint sealing details ~~use~~ SIPA's typical joint sealing details ~~shall be used~~. SIPA details are available at www.sips.org.
2. Use spray foam to seal penetrations through the SIP panels.
3. Any damaged area shall be repaired.
4. All gaps and penetrations through SIPs including windows, doors, and foundation or roof connections shall be air-sealed with expanding foam compatible with the SIP materials.

Grade I (Minor Defects)

Shall meet the minimum installation requirements for SIP products above and the following requirements:

1. SIP panels shall be properly aligned and unsealed penetrations extending from the interior to exterior of the panels shall not be permitted.
2. 2% or less of the total area of the SIPs panels have damage which is unrepaired, including but not limited to cutouts for electrical boxes, pipes and other penetrations.

Grade II (Moderate to Frequent Defects)

Shall meet the minimum installation requirements for SIPs products above and the following:

1. Greater than 2% and less than 5% of the total area of the SIP panels have damage which is unrepaired, including but not limited to cutouts for electrical boxes, pipes and other penetrations.
2. SIP panels shall be properly aligned and unsealed penetrations extending from the interior to exterior of the panels shall not be permitted.

Grade III (Major Defects)

SIP panel installations not complying with the minimum installation requirements and Grade I or Grade II requirements above shall be considered a Grade III installation.

Grade III installations shall be recorded and shall be modeled as specified by Section 4.2.2.2.2 of this Standard.

A-2.3 Reflective/Radiant Grading Criteria

Regarding thermal performance claims or R-values:

1. R-value claims for the air space adjacent to a reflective insulation product shall be based on average cavity depth (where not less than 1/2"), heat flow direction which represents the application (wall, ceiling or floor), temperature of the airspace surfaces relative to the specific wall assembly, location of the airspace in the assembly, and design climate conditions.

2. When utilizing R-value claims for the air space adjacent to a reflective insulation

2. When utilizing R-values claims for the air space adjacent to a reflective insulation product, ~~the enclosed airspaces shall be sealed cavities which do not to allow air flow in or out of the cavity~~ the air space shall be a totally enclosed and unventilated cavity that minimizes airflow into or out of it in accordance with ASTM C727.
3. Where utilizing R-values based on testing in accordance with ASTM C1224, the reflective insulation product shall be installed as tested. air-space shall be enclosed on all 6 sides by building components installed in the field in a manner consistent with the materials and methods used in the tested assembly, including sealing of joints between the enclosing building components if used. All other R-value claims by the manufacturer for the assembly including the airspace shall be based on ASTM C1224, ~~the Standard Specification of Reflective Insulation or per the current FTC Rule 460 requirements.~~ The assembly that is tested for thermal resistance shall be representative of the field assembly.
4. Reflective airspaces behind cladding or otherwise located to the exterior side of the air barrier layer for the assembly shall not claim R-values based on having an airspace except where the cladding and the perimeter of the airspace creates a totally enclosed air space.

A-2.3.1 Reflective Insulation in Ceilings, Walls and Floors

Reflective insulation products include types with multiple layers, reflective bubble, and reflective foam – refer to the manufacturer’s instructions for the product’s installation details.

1. The products shall be permitted to be either face or side (inset) stapled and shall be permanently attached to the framing member;
2. When side or inset stapled, reflective insulation shall be installed at the depth in the cavity to attain the required airspace(s). Refer to manufacturer’s installation details for the specific application, including required airspace dimensions. Where the cavity is partitioned to provide two or more airspaces that are each claimed for R-value contribution, the attachment of the reflective material separating the spaces shall be sealed to the framing to prevent air-exchange between the two or more airspaces;
3. When face-stapled, the material width shall match the framing width (e.g. 16” wide material is used for 16” on-center framing).
 - a. Exception: Nonstandard cavity widths.
4. When face-stapled, the staple tabs shall be aligned with the direction of the framing;
5. When reflective insulation is to serve as a vapor retarder, the tabs are over-lapped or taped when face-stapled. When inset stapled, the edges shall be attached to the sides, top and bottom of the framing.
6. Reflective insulation and radiant barriers (sheet type) materials shall not be laid directly on top of the attic floor or insulation materials installed above the ceiling.
7. Reflective insulation and radiant barriers installed under slabs shall not claim R-values based on having an airspace.
8. Reflective airspaces behind cladding or otherwise located to the exterior side of the air barrier layer for the assembly shall not claim R-values based on having an air-space except where the cladding and perimeter of the airspace creates a totally enclosed air space.

A-2.3.1.1 Grade I (Minor Defects)

Shall meet the minimum installation requirements in ASTM standard C727 and shall also the following area coverage requirements:

2% or less of the area is not insulated such that the building envelope exterior sheathing (wall) is visible from the building’s interior ~~and that air leakage is not evident between the sheathing and radiant barrier.~~

A-2.3.1.2 Grade II (Moderate to Frequent Defects)

A-2.3.1.2 Grade II (Moderate to Frequent Defects)

Shall meet the minimum installation requirements in ASTM standard C727 and shall also the following area coverage requirements:

Greater than 2% and less than 10% of the area which is available for insulation is not insulated such that the building envelope exterior sheathing (wall) is visible from the building's interior ~~and that air leakage is not evident between the sheathing and radiant barrier.~~

A-2.3.1.3 Grade III (Substantial Defects)

Installations not complying with the minimum installation requirements in ASTM standard C727 and Grade I or Grade II area coverage requirements above shall be considered a Grade III installation.

Grade III installations shall be recorded and shall be modeled as specified by Section 4.2.2.2.2 of this Standard.

A-2.3.2 Attic Radiant Barriers

Minimum Requirements:

1. Attic radiant barriers shall be installed with an airspace adjacent to the low emittance (metallic) surface(s);
2. When the radiant barrier only has one low emittance surface, it shall be on the bottom side (in the direction of the ceiling);
3. Attic and/or roof ventilation shall be maintained. Roof, gable and soffit vents shall not be covered.
4. The radiant barrier shall be installed on gable ends.
5. The radiant barrier shall be firmly secured.

Attic radiant barriers shall be permitted to be installed using one of the following three methods

RB Method 1: Deck applied – aluminum faced oriented strand board or plywood; radiant barriers applied in this manner shall be perforated.

RB Method 2: Draped – radiant barrier draped over the trusses or rafters;

RB Method 3; Truss applied – radiant barrier stapled to the bottom of the top cord of the roof truss or rafter.

A-2.3.2.1 Grade I (Minor Defects)

Shall meet the minimum installation requirements in ASTM C1743 and shall also meet the following area coverage requirements:

1. 2% or less of the roof is bare wood or does not include low-emittance.
2. 2% or less of the surface has contaminates, particles or ink on the surface (e.g. dirt, printing of product identification, etc.) reduces effectiveness.
3. Radiant barrier is installed to cover the face of the rafter (Method 3 only).

A-2.3.2.2 Grade II (Moderate to Frequent Defects)

Shall meet the minimum installation requirements in ASTM C1743 and shall also meet the following area coverage requirements:

1. 3% or greater and 10% or less of the roof is bare or does not include the radiant surface.
2. 3% or greater and 10% or less of the surface has contaminates, particles or printed information on the .
3. Radiant barrier is inset stapled (Method 3 only).

A-2.3.2.3 Grade III (Substantial Defects)

Installations not complying with the minimum installation requirements in ASTM C1743 and Grade I or Grade II area coverage requirements above shall be considered a Grade III

installation.

Grade III installations shall be recorded and shall be modeled as specified by Section 4.2.2.2.2 of this Standard.

Additionally, radiant barrier installations which have the following issues shall be deemed to be Grade III:

1. Radiant barrier is not permanently attached;
2. Radiant barrier is not perforated (RB Method 1 only).

A-2.3.3 Interior Attic Radiation Control Coatings (IRCCs)

IRCC materials are a liquid applied with an emittance of 0.25 or less.

Application Requirements:

1. The IRCCS shall be in permanent contact with the underside of the roof deck and should cover the underside of all roof deck and gable surfaces.
2. The coating shall render the application surface to an overall metallic finish that in some cases retains the texture characteristics of the wood surface.
3. The coating surface shall be dry to the touch.

A-2.3.3.1 Grade I (Minor Defects)

Shall meet the minimum installation requirements in ASTM C1321 and shall also meet the following area coverage requirements:

Less than 2% of the surface is bare wood or discolored.

A-2.3.3.2 Grade II (Moderate to Frequent Defects)

Shall meet the minimum installation requirements in ASTM C1321 and shall also meet the following area coverage requirements:

Greater than 2% and equal to or less than 10% of the surface is bare wood or discolored.

A-2.3.3.3 Grade III (Substantial Defects)

Installations not complying with the minimum installation requirements in ASTM C1321 and Grade I or Grade II area coverage requirements above shall be considered a Grade III installation.

Grade III installations shall be recorded and shall be modeled as specified by Section 4.2.2.2.2 of this Standard.

A-3.0 Normative References:

[FTC Rule 460, 16 CFR Part 460, "Labeling and Advertising of Home Insulation: Trade Regulation Rule." Federal Trade Commission, Washington, D.C.](#)

[ANSI/ASHRAE 90.1-2016, "Energy Standard for Buildings Except of Low Rise Residential Buildings." American Society of Heating, Refrigerating, and Air Conditioning Engineers, Atlanta, GA, 2012.](#)

[ASHRAE Handbook of Fundamentals, 2013/2017. American Society of Heating Refrigerating and Air Conditioning Engineers, Atlanta, GA.](#)

ASTM Installation Standards for Building Insulation Products

ASTM C727: Standard Practice for Installation and Use of Reflective Insulation in Building Constructions

ASTM C1015 - 06(2011)e1:

- Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation

[ASTM C1224, "Standard Specification for Reflective Insulation for Building Applications."](#)
[ASTM International, West Conshohocken, PA.](#)

ASTM C1743 – 12:

- Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction

ASTM C1320 - 10(2016):

- Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction

ASTM C1321: 15

- Standard Practice for Installation and Use of Interior Radiation Control Coating Systems (IRCCS) in Building Construction

[ASTM C1848: 17a Standard Practice for Installation of High-Pressure Spray Polyurethane Foam Insulation for the Building Enclosure](#)

[IECC 2015: International Energy Conservation Code, 2015 Edition](#)