DrJ Research Report

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Foam Plastic Insulating Sheathing Products & Accessories Used as a Code Compliant Water-Resistive Barrier (WRB) System

Trade Secret Report Holder:

Foam Sheathing Committee (FSC) Members

americanchemistry.com/industry-groups/foam-sheathing-committee-fsc

continuousinsulation.org

CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 16 00 - Sheathing

Section: 06 16 13 - Insulated Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 - Thermal Insulation

1 Innovative Products Evaluated[1]

1.1 Foam Plastic Insulating Sheathing (FPIS) products from the following manufacturers are recognized in this report:

1.1.1 Atlas Roofing Corporation

1.1.2 BASF Corporation

1.1.3 DuPont de Nemours, Inc.

1.1.4 Hunter Panels

1.1.5 Insulfoam

1.1.6 Kingspan Insulation, LLC

1.1.7 Owens Corning

1.1.8 Progressive Foam Technologies Inc.

1.1.9 Rmax, a Business Unit of Sika Corporation

2 Evaluation Scope

2.1 This research report provides a central location for the identification of products that have been approved for use as a WRB.

2.1.1 The products listed in this report are those that have been listed in code evaluation reports as approved for use as a WRB. These reports are shown in **Table 1**.

2.2 This research report supplements existing product certifications and is intended only to provide information on the products approved for the manufacturers listed in **Section 1.1** For the purposes of this report, DrJ is not

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certifying the products, but rather is providing the user with direction on where they can obtain specific information for the products shown. For details on the products found in **Table 1**, see the manufacturer code evaluation reports or listings.

2.3 Any code compliance issues not specifically addressed in this section are outside the scope of this DRR.

2.4 Any engineering evaluation conducted for this DRR was performed within DrJ's professional scope of work on the dates provided herein.

3 Definitions

3.1 New Materials[2] are defined as building materials, equipment, appliances, systems, or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[3] The design strengths and permissible stresses shall be established by tests[4] and/or engineering analysis.[5]

3.2 Duly Authenticated Reports[6] and Research Reports[7] are test reports and related engineering evaluations, which are written by an approved agency[8] and/or an approved source.[9]

3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).[10]

3.3 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.

3.4 An approved source is "approved" when a professional engineer (i.e., Registered Design Professional) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[11]

3.5 The regulatory authority shall enforce[12] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[13] stating the nonconformance and the path to its cure.

3.6 The regulatory authority shall accept Duly Authenticated Reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[14]

3.7 Approval equity is a fundamental commercial and legal principle.[15]

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation[16]

4.1 *Standards*

4.1.1 *ASTM C1289: Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*

4.1.2 *ASTM C209: Standard Test Methods for Cellulosic Fiber Insulating Board*

4.1.3 *ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*

4.1.4 *ASTM D226: Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing*

4.1.5 *ASTM E2556: Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment*

4.1.6 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*

4.2 *Regulations*

4.2.1 *IBC – 18, 21, 24: International Building Code®*

4.2.2 *IRC – 18, 21, 24: International Residential Code®*

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5 Regulatory Compliance Assessment for Use as WRB

5.1 *Code Requirements for the Use of Foam Plastic Insulation as a WRB*

5.1.1 Requirements for the use of foam plastic insulation as a WRB are given in IBC Section 1403.2 and Section 2510.6. For the IRC, the provisions are found in IRC Section R703.2 and Section R703.7.3.

5.1.2 It is the responsibility of the user to apply the requirements of the specific edition of the building code used in the jurisdiction where the structure is to be built.

5.1.3 It is also the responsibility of the user to verify the certifications listed in code evaluation reports along with the details found therein for compliance with that listing.

5.2 *Product Code Compliance*

5.2.1 **Table 1** shows the FPIS products from the manufacturers listed in **Section 1.1** that indicate they have met the requirements for use as a WRB.

5.2.1.1 Consult the manufacturer installation instructions and associated evaluation report for details specific to the intended application.

5.2.1.1.1 The code evaluation reports or manufacturer installation instructions generally provide details on the use of joint sealing tapes, flashing materials, and sealants that are approved for use with the product to achieve performance as a WRB.

5.2.1.1.2 See **Section 6** for general industry good practice for the installation of FPIS used as a WRB.

5.3 FPIS products are not required to be detailed for use as a WRB in the following applications:

5.3.1 Not required when installed over concrete or masonry in accordance with IBC Section 1402.2 Exception 1 and IRC Section R703.1.1 Exception 1.

5.3.2 Not required for EIFS complying with IBC Section 1407.4.1 in accordance with IBC Section 1402.2 Exception 3.

5.4 Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the building official shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the building official for the period required for retention of public records.

5.5 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.

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Table 1. Foam Sheathing Product Code Compliance

Manufacturer	Evaluation Report Number	Product(s)	Type of Application			
			IBC 1403.2[1]	IBC 2510.6[2]	IRC R703.2[3]	IRC R703.7.3[4]
Atlas Roofing Corporation	ESR-1375	EnergyShield® EnergyShield® Pro EnergyShield® PanelCast EnergyShield® CGF EnergyShield® CGF Pro EnergyShield® XR	Y	Y	Y	Y
	ESR-1962 ULEX.R16529-01	ThermalStar LCi	Y	Y	Y	Y
	ESR-1962 TER 1905-02 ULEX.R16529-01	ThermalStar LWi ThermalStar SWi	Y	Y	Y	Y
DuPont de Nemours, Inc.	CCRR-0435	Thermax™ Sheathing Thermax™ Light Duty Thermax™ Heavy Duty Thermax™ XARMOR (ci) Thermax™ Metal Building Thermax™ White Finish Thermax™ ci Exterior	Y	Y	Y	Y
	CCRR-0440	Thermax™ Metal Building Board NH Thermax™ White Finish NH Thermax™ Heavy Duty NH Thermax™ Light Duty NH Interior/Exterior Thermax™ Basic NH	Y	Y	Y	Y
	ESR-4755	Styrofoam™ Cavitymate™ Styrofoam™ Cavitymate™ Plus Styrofoam™ Cavitymate™ XR Styrofoam™ Cavitymate™ Ultra Styrofoam™ Ultra Styrofoam™ Duramate™ Plus Styrofoam™ Residential Sheathing Styrofoam™ Residing Board Styrofoam™ UtilityFit Styrofoam™ Scoreboard, Styrofoam™ Sheathing Material Styrofoam™ Square Edge Styrofoam™ Tongue and Groove Styrofoam™ Plazamate XR	Y	Y	Y	Y
	ESR-3089	Tuff-R™ Tuff-R™ C Super Tuff-R™ Super Tuff-R™ C ISOCAST™ R	Y	Y	Y	Y

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Table 1. Foam Sheathing Product Code Compliance

Manufacturer	Evaluation Report Number	Product(s)	Type of Application			
			IBC 1403.2[1]	IBC 2510.6[2]	IRC R703.2[3]	IRC R703.7.3[4]
Hunter Panels	TER 1402-01	Xci Foil (Class A) Xci Foil (Class A) PLUS Xci 286	Y	Y	Y	Y
Insulfoam	TER 2309-01	Blueskin VP Tech	Y	Y	Y	Y
Kingspan	TER 1011-01	GreenGuard® CM GreenGuard® LG CM GreenGuard® SL GreenGuard® LG SL GreenGuard® SLX GreenGuard® LG SLX GreenGuard® PGU	Y	Y	Y	Y
Owens Corning	ULEX.R8811	FOAMULAR® FOAMULAR® NGX™	Y	Y	Y	Y
Progressive Foam Technologies Inc.	ULEX.R18532	Proboard® FR Proboard® Original Proboard® Versa™ Halo® Subterra®	Y	Y	Y	Y
Rmax, a Business Unit of Sika Corporation	TER 1212-03	ECOMAXci® FR Air Barrier EVOMAXci®	Y	Y	Y	Y
	TER 1207-01	Thermasheath® Thermasheath®-SI	Y	Y	Y	Y
	TER 1309-03	Thermasheath® ECOMAXci® FR ECOMAXci® FR White TSX-8500 TSX-8510	Y	Y	Y	Y

1. IBC Section 1403.2 applies to compliance of a FPIS WRB in wall assemblies designed and constructed in accordance with IBC Chapter 14 and IBC Section 2510 (Portland cement stucco) (refer to note 2 below). The basis of compliance for WRB performance is:
   - No. 15 asphalt felt, complying with ASTM D226 for Type 1 felt.
   - ASTM E2556 Type I or II.
   - Foam plastic insulating sheathing water-resistive barrier systems complying with Section 1402.2 and installed in accordance with manufacturer installation instructions.
   - ASTM E331 in accordance with Section 1402.2.
   - Other approved materials installed in accordance with the manufacturer installation instructions

   Where indicated under "type of application" the listed research report provides test documentation for code approval purposes.
2. IBC Section 2510.6.1 states the basis of equivalency for the FPIS WRB performance, which is having (1) "…a water resistance equal to or greater than that of two layers of WRB complying with ASTM E2556, Type I" or (2) "…one layer of WRB complying ASTM E2556, Type II."

   For Option (2), the stucco and WRB shall be separated by a layer of FPIS or other nonwater absorbing layer or a drainage space, or means of a drainage complying with IBC Section 2510.6.2 (see **Figure 1**).
3. Refer to note 1 above for IBC (similar basis for equivalency).
4. Refer to note 2 above for IBC (similar, but IRC does not refer to ASTM E2556 and instead still retains the reference to 60-minute grade D paper in the exception statement, which is applicable to foam sheathing [a non-vapor permeable WRB]).

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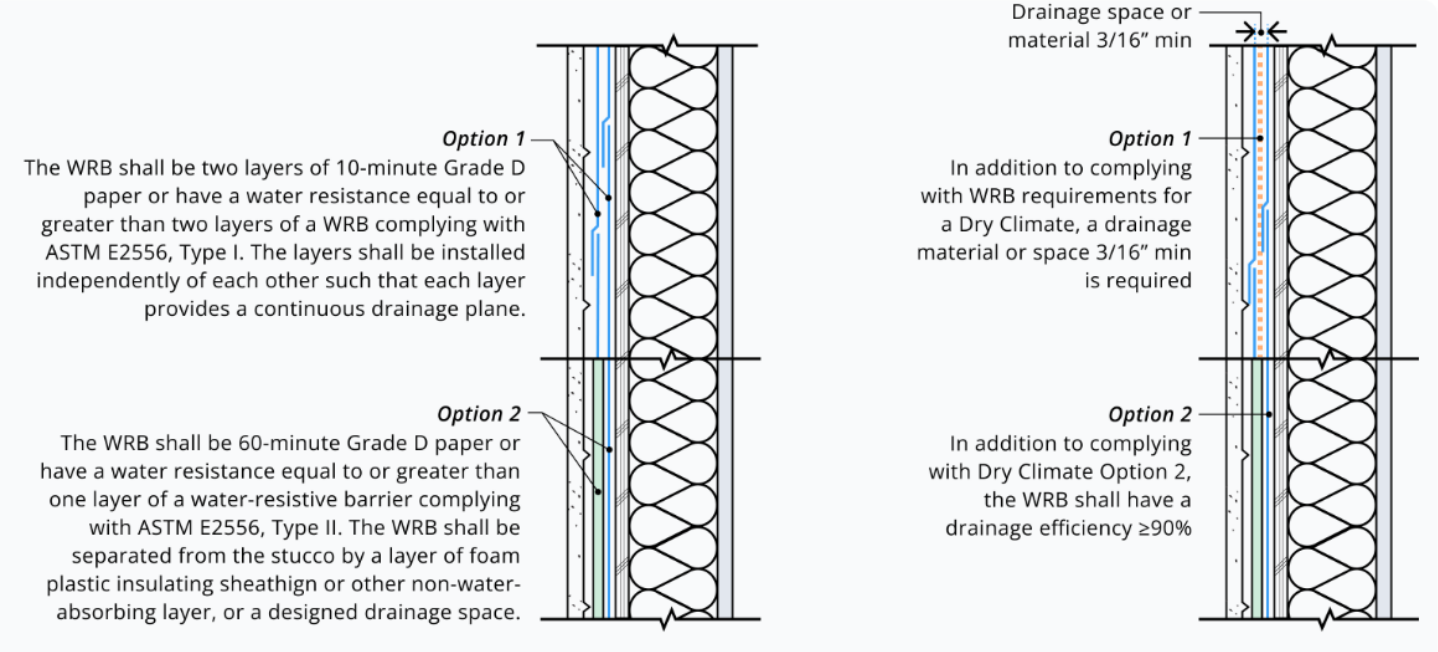

Figure 1. IBC Section 2510.6 and IRC Section R703.7.3, WRB at Exterior Plaster (Stucco)

5.6 *WRB System Components and Installation*

5.6.1 The manufacturer installation instructions and evaluation report specify the materials approved for sealing the WRB system. These materials include compatible sheathing tapes and self-adhering flashing membranes. Proper integration with fenestration and other wall penetrations must be achieved using these approved tapes and membranes in accordance with the manufacturer details.

5.7 Where the application falls outside of the performance evaluation, conditions of use, and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

5.8 Any regulation specific issues not addressed in this section are outside the scope of this report.

6 Installation

6.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, the manufacturer code compliance report, and the applicable building code.

6.2 In the event of a conflict between the manufacturer installation instructions and the manufacturer code compliance report, the more restrictive shall govern.

6.3 Areas of consideration required for a complete WRB system include but are not limited to the following:

6.3.1 Board orientation

6.3.2 Fastener selection and spacing

6.3.3 Joint and corner treatment (tapes, flashings, etc.)

6.3.4 Penetrations

6.3.5 Integration of fenestration products

6.3.6 General flashing

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6.4 For applications outside the scope of this research report or the referenced research reports, an alternate means of code compliance is required.

7 Substantiating Data

7.1 Product certification reports for the products listed in **Table 1**.

7.2 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as indicated in the manufacturer research reports listed in **Table 1**.

7.3 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or RDPs. Accuracy of external test data and resulting analysis is relied upon.

7.4 Where pertinent, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent[17] to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

7.5 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, or Duly Authenticated Reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in Duly Authenticated Reports, may be dependent upon published design properties by others.

7.6 Testing and engineering analysis: The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.[18]

7.7 Where additional condition of use and/or regulatory compliance information is required, please search for Foam Plastic Insulating Sheathing (FPIS) products on the DrJ Certification website.

8 Findings

8.1 As outlined in **Section 5**, Foam Plastic Insulating Sheathing (FPIS) products have performance characteristics that were tested and/or meet applicable regulations and are suitable for use pursuant to its specified purpose.

8.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, Foam Plastic Insulating Sheathing (FPIS) products shall be approved for the following applications:

8.2.1 Use as a WRB in accordance with the requirements of IBC Section 1403.2 and Section 2510.6, and IRC Section R703.2 and Section R703.7.3.

8.3 Any application specific issues not addressed herein can be engineered by an RDP.

8.4 IBC Section 104.2.3[19] (IRC Section R104.2.2[20] and IFC Section 104.2.3[21] are similar) in pertinent part states:

> **104.2.3 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved.

8.5 **Approved**:[22] Building regulations require that the building official shall accept Duly Authenticated Reports.[23]

8.5.1 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited.

8.5.2 An approved source is "approved" when an RDP is properly licensed to transact engineering commerce.

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8.5.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

9 Conditions of Use

9.1 At a minimum, this product shall be installed per **Section 6** of this DRR.

9.2 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:

9.2.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

9.2.2 This report and the installation instructions shall be submitted at the time of permit application.

9.2.3 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.

9.2.4 These Foam Plastic Insulating Sheathing (FPIS) products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 110.4, IBC Section 104.7.2,[24] IBC Section 1703, IRC Section R109,[25] and IRC Section R109.2.

9.2.5 The application of these Foam Plastic Insulating Sheathing (FPIS) products in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.

9.3 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, "the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.2.3,"[26] all of IBC Section 104 and IBC Section 105.4. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[27] stating the nonconformance.

9.4 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

10 Identification

10.1 The Foam Plastic Insulating Sheathing (FPIS) products from manufacturers listed in **Section 1.1** are identified by a label on the board or packaging material bearing the manufacturer name, product name, label of the third-party inspection agency, and other information to confirm code compliance.

10.2 Products manufactured by Progressive Foam Technologies Inc. are additionally identified by the UL Mark and reference to UL File R18532.

10.3 Additional technical information can be found at the respective FSC member websites provided at americanchemistry.com/industry-groups/foam-sheathing-committee-fsc.

11 Review Schedule

11.1 This report is subject to periodic review and revision. For the latest version, visit drjengineering.org.

11.2 For information on the status of this report, please contact DrJ Engineering.

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Notes

[1] For more information, visit drjengineering.org or call us at 608-310-6748.

[2] 2021 IBC Section 1702

[3] Alternative Materials, Design, and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission AND 2021 IBC Section 104.11.

[4] 2021 IBC Section 1706

[5] The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice: 2021 IBC Section 1706.1.

[6] 2021 IBC Section 1707.1

[7] 2021 IBC Section 1703.4.2

[8] 2021 IBC Definitions: Approved Agency

[9] 2021 IBC Definitions: Approved Source

[10] All ideas, engineering analysis, and test data are proprietary intellectual property (IP) and trade secrets (TS) and should not be provided to anyone. In particular, public regulatory officials are subject to freedom of information act requests – federal and state public records acts. This means that IP and TS will be in the public domain when any information is provided. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA), where providing test reports, engineering analysis, and/or other related IP/TS is subject to prison of not more than 10 years and/or a $5,000,000 fine or 3 times the value of the IP and TS. To follow DTSA and to comply with state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please visit http://www.drjengineering.org/AppendixC and https://www.drjcertification.org/cornell-2016-protection-trade-secrets.

[11] https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

[12] 2021 IBC Section 104

[13] 2021 IBC Section 104.11 AND 2021 IBC Section 105.3.1

[14] 2021 IBC Section 1707.1

[15] https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

[16] Unless otherwise noted, all references in this Listing are from the 2024 version of the codes and the standards referenced therein. This material, product, design, service, and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.

[17] 2021 IBC Section 104.11

[18] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

[19] 2021 IBC Section 104.11

[20] 2021 IRC Section R104.11

[21] 2021 IFC Section 104.10, 2018 IFC Section 104.9

[22] Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[23] 2021 IBC Section 1707.1

[24] 2021 IBC Section 110.4

[25] 2021 IRC Section R104.4

[26] 2021 IBC Section 104.11

[27] 2021 IBC Section 104.11 AND 2021 IBC Section 105.3.1

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