Listing and Technical Evaluation Report™

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R2+ SILVER, R2+ MATTE and R2+ BASE Fire Performance in Exterior Walls of Buildings of Type I-IV Construction

Trade Secret Report Holder:

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CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 10 00 - Rough Carpentry

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 - Thermal Insulation

Section: 07 48 00 - Exterior Wall Assemblies

1 Innovative Products Evaluated[1]

1.1 R2+ Products:

1.1.1 R2+ SILVER

1.1.2 R2+ MATTE

1.1.3 R2+ BASE

2 Product Description and Materials

2.1 R2+ SILVER is comprised of a closed-cell polyisocyanurate (polyiso) insulation board adhered to "*tri-laminate*" foil facers and is compliant with ASTM C1289 Type I, Class 1, Grade 2 and Grade 3.

2.1.1 Layers of the facer material are as follows: aluminum foil, kraft paper, aluminum foil.

2.2 R2+ MATTE is comprised of a closed-cell polyiso insulation board adhered to coated glass facers and is compliant with ASTM C1289 Type II, Class 2, Grade 2 and Grade 3.

2.3 R2+ BASE is comprised of a closed-cell polyiso insulation board with coated glass facers laminated to APA-TECO rated exposure fire treated plywood and is compliant with ASTM C1289 Type V.

2.4 The innovative products evaluated in this report are shown in **Figure 1**.

Figure 1. R2+ Products: R2+ SILVER, R2+ MATTE and R2+ BASE

2.5 The foam core of R2+ Products is manufactured in accordance with ASTM C1289.

2.6 *Material Availability*

2.6.1 *Thickness:*

2.6.1.1 *R2+ SILVER and R2+ MATTE:*

2.6.1.1.1 1" (25 mm) through $3^{1}/_{2}$" (89 mm)

2.6.1.2 *R2+ BASE:*

2.6.1.2.1 Available with either a $^{5}/_{8}$" or $^{3}/_{4}$" fire treated plywood and 1" through $3^{1}/_{2}$" coated glass polyiso

2.6.1.2.1.1 Total thickness with $^{5}/_{8}$" substrate: $1^{5}/_{8}$" through $4^{5}/_{8}$"

2.6.1.2.1.2 Total thickness with $^{3}/_{4}$" substrate: $1^{3}/_{4}$" through $4^{3}/_{4}$"

2.6.2 *Standard Product Width:*

2.6.2.1 48" (1,219 mm)

2.6.3 *Standard Product Length:*

2.6.3.1 *R2+ SILVER and R2+ MATTE:*

2.6.3.1.1 96" (2,438 mm)

2.6.3.1.2 120" (3,048 mm)

2.6.3.1.3 144" (3,657 mm)

2.6.3.2 *R2+ BASE:*

2.6.3.2.1 96" (2,438 mm)

2.6.4 Custom widths, lengths and thicknesses for R2+ SILVER and R2+ MATTE are available upon request.

2.7 As needed, review material properties for design in **Section 6** and to regulatory evaluation in **Section 8**.

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 Testing and/or inspections conducted for this duly authenticated report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body and/or a licensed Registered Design Professional (RDP).

3.5.1 The Center for Building Innovation (CBI) is ANAB[12] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[13] 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[14] stating the nonconformance and the path to its cure.

3.7 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.[15]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.[16] Therefore, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent.[17]

3.9 Approval equity is a fundamental commercial and legal principle.[18]

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation[19]

4.1 *Standards*

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

4.1.2 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

4.1.3 *ASTM E119: Standard Test Methods for Fire Tests of Building Construction and Materials*

4.1.4 *ASTM E136: Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C*

4.1.5 *ASTM E1354: Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*

4.1.6 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*

4.1.7 *FM 4880: Approval Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials*

4.1.8 *NFPA 259: Standard Test Method for Potential Heat of Building Materials*

4.1.9 *NFPA 268: Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source*

4.1.10 *NFPA 285-12: Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*[20]

4.1.11 *NFPA 286: Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*

4.1.12 *UL 723: Test for Surface Burning Characteristics of Building Materials*

4.1.13 *UL 1040: Fire Test of Insulated Wall Construction*

4.1.14 *UL 1715: Fire Test of Interior Finish Material*

4.2 *Regulations*

4.2.1 *IBC – 15, 18, 21: International Building Code®*

4.2.2 *IRC – 15, 18, 21: International Residential Code®*

4.2.3 *IECC – 15, 18, 21: International Energy Conservation Code®*

5 Listed[21]

5.1 Equipment, materials, products or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), approved agency (i.e., CBI and DrJ), and/or approved source (i.e., DrJ) or other organization concerned with product evaluation (i.e., DrJ) that maintains periodic inspection (i.e., CBI) of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 *General*

6.1.1 R2+ Products are Foam Plastic Insulating Sheathing (FPIS) complying with IBC Section 2603.

6.1.2 R2+ Products are used in exterior walls of buildings of any height and of Type I-IV construction in accordance with IBC Section 2603.5.

6.1.3 Environmental Product Declarations (EPD) for R2+ Products are available at www.polyiso.org/page/EPDs.

6.2 *Fire Safety Performance*

6.2.1 *Surface Burning Characteristics:*

6.2.1.1 R2+ Products were evaluated to assess performance with regards to flame spread and smoke-developed indexes in accordance with ASTM E84 as specified in IBC Section 2603.3 and IBC Section 2603.5.

6.2.1.2 Flame spread and smoke developed indices are provided in **Table 1**.

Table 1. Surface Burning Characteristics of R2+ Products[1]

Product Name	Flame Spread Index	Smoke-Developed Index	Classification
R2+ SILVER	≤ 75	≤ 450	Class B
R2+ MATTE			
R2+ BASE			

1. Foam core tested in accordance with ASTM E84. Flame spread and smoke-developed indexes are shown for comparison purposes only and are not intended to represent the performance under actual fire conditions.

6.2.2 *Ignition:*

6.2.2.1 R2+ Products were evaluated to assess performance with regard to ignition (NFPA 268) in accordance with IBC Section 2603.5.7. R2+ Products comply with this section when the exterior side of the sheathing is protected with one of the following materials:

6.2.2.1.1 A thermal barrier complying with IBC Section 2603.4.

6.2.2.1.2 A minimum 1" (25 mm) thickness of concrete or masonry.

6.2.2.1.3 Glass-fiber-reinforced concrete panels of a minimum thickness of $^{3}/_{8}$" (9.5 mm).

6.2.2.1.4 Metal-faced panels having minimum 0.019" thick (0.48 mm) aluminum or 0.016" thick (0.41 mm) corrosion-resistant steel outer facings.

6.2.2.1.5 A minimum $^{7}/_{8}$" (22.2 mm) thickness of stucco complying with IBC Section 2510.

6.2.2.1.6 A minimum $^{1}/_{4}$" (6.35 mm) thickness of fiber cement siding complying with IBC Section 1404.16[22] and IBC Section 1404.16.1[23] or IBC Section 1404.16.2.[24]

6.2.3 *Potential Heat:*

6.2.3.1 R2+ Products were tested in accordance with NFPA 259 to assess the potential heat generated by the FPIS in accordance with IBC Section 2603.5.3, as shown in **Table 2**.

Table 2. Potential Heat of R2+ Products

Product	Potential Heat[1] (Btu/lb)
R2+ SILVER	11,503
R2+ MATTE	11,503
R2+ BASE	11,503

SI: 1 Btu/lb = 0.0025 MJ/kg

1. Tested in accordance with NFPA 259.

6.2.4 *Vertical and Lateral Fire Propagation:*

6.2.4.1 R2+ Products were tested to assess their performance with regard to vertical and lateral fire propagation in accordance with NFPA 285 and 2018 IBC Section 2603.5.5.

6.2.4.2 Engineering analysis has also been conducted to assess substitution of other products within the approved wall assemblies.

6.2.4.3 The wall assemblies listed in **Table 3**, **Table 4**, **Table 5** and **Table 6** are approved for use in buildings of Type I-IV construction by demonstrating equivalency to similar assemblies tested in accordance with NFPA 285 and meeting the prescriptive requirement for <25 Flame Spread Index (FSI) material as required in IBC Section 2603.5.4.

Table 3. Approved NFPA 285 Wall Assemblies Using R2+ MATTE as Exterior Insulation[1,2,3]

Wall Component	Materials
Base Wall System Use either 1, 2, 3 or 4	1. Cast concrete walls 2. CMU concrete walls 3. 25-gauge min. 3 5/8" (min.) steel studs spaced 24" o.c. (max.) a. 5/8" Type X gypsum wallboard interior b. Lateral bracing every 4' 4. FRTW (Fire-Retardant-Treated Wood) studs: min. nominal 2x4 dimension, spaced 24" o.c. (max.) a. 5/8" Type X gypsum wallboard interior b. Bracing as required by building code
Fire-Stopping at Floor Lines	1. Any approved mineral-fiber-based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2. Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction.
Cavity Insulation Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 or 15. Items 8, 9, 10 and 11 may only be used with exterior sheathing 2.	1. None 2. 1 1/2" min. Covestro EcoBay CC SPF (up to full cavity thickness) 3. 1 1/2" min. BASF Walltite SPF (up to full cavity thickness) 4. Any noncombustible insulation per ASTM E136 5. Any mineral fiber (Board type Class A ASTM E84 faced or unfaced) 6. Any fiberglass (Batt type Class A ASTM E84 faced or unfaced) 7. Any foam plastic insulation (SPF or board type) that has been tested per ASTM E1354 (at a minimum of 20 kW/m^2 heat flux) and shown by analysis to be less flammable (improved T_{ign}, PK. HRR) than Covestro EcoBay CC or BASF Walltite 8. NCFI InsulBloc SPF (up to full cavity thickness) 9. Icynene MD-C-200v3 (Proseal) up to 5 1/2 inches (only with 1/2 in. [min.] exterior gypsum sheathing) 10. SWD Urethane Quik-Shield 112 up to 6 inches (max.) stud cavities with an air gap not exceeding 2 1/2 inches. 11. 1 1/2" (min.) ThermoSeal 2000 (up to full cavity thickness). 12. Carlisle® SealTite PRO High Yield, SealTite PRO Open Cell, SealTite PRO No Mix, SealTite PRO No Trim 21 or SealTite PRO OCX – up to full cavity thickness with 1/2" (min.) exterior gypsum sheathing 13. Gaco (Firestone) F6500R, 052N, F4500, 183M, F1850, F1880 – 3 1/2" (max.) for use with 5/8" Exterior Gypsum Sheathing 14. JM Corbond III or Corbond IV – Full stud cavity depth or less for use with 5/8" exterior gypsum sheathing 15. Huntsman ProSeal HFO (8 in. max. thickness with no air gap, 6 inch max. thickness with air gap) for use with 1/2" or thicker exterior gypsum sheathing
Exterior Sheathing Use either 1, 2 or 3	1. None (only with claddings 1-6 and cavity insulation 1, 2, 4, 5 or 6) 2. 1/2" or thicker exterior gypsum sheathing 3. 1/2" (min.) FRTW structural panels in Type III construction
Water Resistive Barrier (WRB) Over Base Wall Surface	See **Table 6**
Exterior Insulation Use option 1	1. 3 1/2" (max.) R2+ MATTE

Table 3. Approved NFPA 285 Wall Assemblies Using R2+ MATTE as Exterior Insulation[1,2,3]

Wall Component	Materials
WRB Over Exterior Insulation	See **Table 6** The exterior insulation may be used with or without CavClear® Masonry Mat over the insulation with a maximum 1" air gap between the CavClear® and the cladding. When CavClear® is used, this may only be used with Cladding 1, 2, 3, 4, 5 or 6 or with thin brick/thin stone adhered to stucco as long as the total thickness is 3/4" min.
Exterior Cladding Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 17 Item 7 may use any tested/approved installation technique. Items 8, 9 or 12 may use any standard installation technique.	1. Brick – Nominal 4" thick, clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick ties/Anchors 24" o.c. (max.). 2. Stucco – Minimum 3/4" thick, exterior cement plaster and lath. For systems that require a more durable WRB system, any building wrap or 15# felt that meets requirement #11 in WRB Over Exterior Insulation (**Table 6**) can be used as a slip sheet between the WRB/exterior insulation and the lath. 3. Limestone – Minimum 2" thick using any standard non-open joint installation technique such as shiplap. 4. Natural stone veneer – Minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone. 5. Cast artificial stone – Minimum 1 1/2" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap. 6. Terra Cotta Cladding – Minimum 1 1/4" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap. 7. Any MCM that has successfully passed NFPA 285. 8. Uninsulated sheet metal building panels including steel, copper, aluminum. 9. Uninsulated fiber-cement siding. 10. Stone/Aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria. 11. Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria. 12. Terra Cotta Cladding – Any rain-screen Terra Cotta (min. 1/2" thick) with ventilated shiplap. 13. 1/2" stucco – Any one coat stucco (1/2" min.) which meets AC11 acceptance criteria or is approved for use in Type I-IV construction or has been tested per NFPA 285 or stays in place when tested per ASTM E119 (stucco exposed to fire) for at least 30 minutes. 14. Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Minimum 3/4". For these systems that require a more durable WRB system, any building wrap or 15# felt that meets requirement #11 in WRB Over Exterior Insulation (**Table 6**) can be used as a slip sheet between the WRB/AVP and the lath. 15. Glen Gery Thin Tech Elite Series Masonry Veneer or TABS II Panel System with 1/2" thick bricks using TABS Wall Adhesive. 16. Natural Stone Veneer – minimum 1 1/4" thick using any standard installation technique. 17. FunderMax M.Look Grey Core – minimum 1/4" thick using any standard installation technique.

SI: 1 in = 25.4 mm

1. The assembly combinations created herein and the various substitutions of products are based on testing and professional thermal engineering analysis by Priest and Associates.
2. Acceptance criteria for ASTM E1354 testing have not been well established in the referenced building codes and foam sheathing related sections. The criteria stated here for substitution of products is based on testing and professional thermal engineering analysis by Priest and Associates.
3. T_{ign} is the time to ignition from the start of the test until the sheathing ignites. Pk. HRR is the peak heat release rate during the test.

Table 4. Approved NFPA 285 Wall Assemblies with R2+ SILVER as Exterior Insulation[1,2,3]

Wall Component	Materials
Base Wall System Use either 1, 2, 3 or 4	1. Cast concrete walls 2. CMU concrete walls 3. 25-gauge min. 3 5/8" (min.) steel studs spaced 24" o.c. (max.) a. 5/8" Type X gypsum wallboard interior b. Lateral bracing every 4' 4. FRTW (fire-retardant-treated wood) studs: min. nominal 2x4 dimension, spaced 24" o.c. (max.) a. 5/8" Type X gypsum wallboard interior b. Bracing as required by code
Fire-Stopping at Floor Lines	1. Any approved mineral-fiber-based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2. Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction.
Cavity Insulation Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 or 15. Items 8, 9, 10 and 11 may only be used with exterior sheathing 2.	1. None 2. 1 1/2" min. Covestro EcoBay CC SPF (up to full cavity thickness) 3. 1 1/2" min. BASF Walltite SPF (up to full cavity thickness) 4. Any noncombustible insulation per ASTM E136 5. Any mineral fiber (Board type Class A ASTM E84 faced or unfaced) 6. Any fiberglass (Batt type Class A ASTM E84 faced or unfaced) 7. Any foam plastic insulation (SPF or board type) that has been tested per ASTM E1354 (at a minimum of 20 kW/m^2 heat flux) and shown by analysis to be less flammable (improved T_{ign}, PK. HRR) than Covestro EcoBay CC or BASF Walltite 8. NCFI InsulBloc SPF (up to full cavity thickness) 9. Icynene MD-C-200v3 (Proseal) up to 5 1/2 inches (only with 1/2 in. [min.] exterior gypsum sheathing) 10. SWD Urethane Quik-Shield 112 up to 6 inches (max.) stud cavities with an air gap not exceeding 2 1/2 inches 11. 1 1/2" (min.) ThermoSeal 2000 (up to full cavity thickness) 12. Carlisle® SealTite PRO High Yield, SealTite PRO Open Cell, SealTite PRO No Mix, SealTite PRO No Trim 21 or SealTite PRO OCX – up to full cavity thickness with 1/2" (min.) exterior gypsum sheathing 13. Gaco (Firestone) F6500R, 052N, F4500, 183M, F1850 or F1880 – 3 1/2" (max.) for use with 5/8" exterior gypsum sheathing 14. JM Corbond III or Corbond IV – Full stud cavity depth or less for use with 5/8" exterior gypsum sheathing 15. Huntsman ProSeal HFO (8 in. max. thickness with no air gap, 6 inch max. thickness with air gap) for use with 1/2" or thicker exterior gypsum sheathing
Exterior Sheathing Use either 1, 2 or 3	1. None (only with cavity insulation 1, 4, 5 or 6) 2. 1/2" or thicker exterior gypsum sheathing 3. 1/2" (min.) FRTW structural panels in Type III construction allowed in place of gypsum sheathing when combustible cavity insulation is not used.
WRB Over Base Wall Surface	See **Table 6**
Exterior Insulation Use option 1	1. 3 1/2" (max.) R2+ SILVER

Table 4. Approved NFPA 285 Wall Assemblies with R2+ SILVER as Exterior Insulation[1,2,3]

Wall Component	Materials
WRB Over Exterior Insulation	See **Table 6** The exterior insulation may be used with or without CavClear® Masonry Mat over the insulation with a maximum 1" air gap between the CavClear® and the cladding. When CavClear® is used, this may only be used with Cladding 1, 2, 3, 4, 5 or 6 or with thin brick/thin stone adhered to stucco as long as the total thickness is 3/4" min.
Exterior Cladding Use 1, 2, 3, 4, 5 or 6	1. Brick – Nominal 4" thick, clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick ties/Anchors 24" o.c. (max.). 2. Stucco – Minimum 3/4" thick, exterior cement plaster and lath. For systems that require a more durable WRB system, any building wrap or 15# felt that meets requirement #11 in WRB Over Exterior Insulation (**Table 6**) can be used as a slip sheet between the WRB/exterior insulation and the lath. 3. Limestone – Minimum 2" thick using any standard non-open joint installation technique such as shiplap. 4. Natural Stone Veneer – Minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone. 5. Cast Artificial Stone – Minimum 1 1/2" thick using any standard non-open joint installation technique such as shiplap. 6. Terra Cotta Cladding – Minimum 1 1/4" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap.

SI: 1 in = 25.4 mm

1. The assemblies' combinations created herein and the various substitutions of products are based on testing and professional thermal engineering analysis by Priest and Associates.
2. Acceptance criteria for ASTM E1354 testing have not been well established in the referenced building codes and foam sheathing related sections. The criteria stated here for substitution of products is based on testing and professional thermal engineering analysis by Priest and Associates.
3. T_{ign} is the time to ignition from the start of the test until the sheathing ignites. Pk. HRR is the peak heat release rate during the test.

Table 5. Approved NFPA 285 Wall Assemblies with R2+ BASE as Exterior Insulation[1,2,3]

Wall Component	Materials
Base Wall System Use either 1, 2, 3 or 4	1. Cast concrete walls 2. CMU concrete walls 3. 25-gauge min. 3 5/8" (min.) steel studs spaced 24" o.c. (max.) a. 5/8" Type X gypsum wallboard interior b. Lateral bracing every 4' 4. FRTW studs: min. nominal 2x4 dimension, spaced 24" o.c. (max.) a. 5/8" Type X gypsum wallboard interior b. Bracing as required by code
Fire-Stopping at Floor Lines	1. Any approved mineral-fiber-based safing insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. 2. Solid FRTW fire blocking at floor line in accordance with building code requirements for Type III construction.

Table 5. Approved NFPA 285 Wall Assemblies with R2+ BASE as Exterior Insulation[1,2,3]

Wall Component	Materials
Cavity Insulation Use either 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 or 15. Items 3, 8, 9, 10 and 11 may only be used with exterior sheathing 2.	1. None 2. 1 1/2" min. Covestro EcoBay CC SPF (up to full cavity thickness) 3. 1 1/2" min. BASF Walltite SPF (up to full cavity thickness) 4. Any noncombustible insulation per ASTM E136 5. Any mineral fiber (Board type Class A ASTM E84 faced or unfaced) 6. Any fiberglass (Batt type Class A ASTM E84 faced or unfaced) 7. Any foam plastic insulation (SPF or board type) that has been tested per ASTM E1354 (at a minimum of 20 kW/m^2 heat flux) and shown by analysis to be less flammable (improved T_{ign}, PK. HRR) than Covestro EcoBay CC or BASF Walltite 8. NCFI InsulBloc SPF (up to full cavity thickness) 9. Icynene MD-C-200v3 (Proseal) up to 5 1/2 inches (only with 1/2 in. [min.] exterior gypsum sheathing) 10. SWD Urethane Quik-Shield 112 up to 6 inches in 6 inch (max.) stud cavities with an air gap not exceeding 2 1/2" 11. 1 1/2" (min.) Thermoseal 2000 (up to full cavity thickness) 12. Carlisle® SealTite PRO High Yield, SealTite PRO Open Cell, SealTite PRO No Mix, SealTite PRO No Trim 21 or SealTite PRO OCX – up to full cavity thickness with 1/2" (min.) exterior gypsum sheathing 13. Gaco (Firestone) F6500R, 052N, F4500, 183M, F1850, F1880 – 3 1/2" (max.) for use with 5/8" Exterior Gypsum Sheathing 14. JM Corbond III or Corbond IV – Full stud cavity depth or less for use with 5/8" exterior gypsum sheathing 15. Huntsman ProSeal HFO (8 in. max. thickness with no air gap, 6 inch max. thickness with air gap) for use with 1/2" or thicker exterior gypsum sheathing
Exterior Sheathing Use either 1, 2 or 3	1. None (only with cavity insulation 1, 2, 4, 5 or 6) 2. 1/2" or thicker exterior gypsum sheathing 3. 1/2" (min.) FRTW structural panels in Type III construction
WRB Over Base Wall Surface	See **Table 6**
Exterior Insulation Use option 1	1. 4 1/4" (max.) R2+ BASE (3 1/2" foam max., 3/4" FR Plywood max.)
WRB Over Exterior Insulation	See **Table 6** The exterior insulation may be used with or without CavClear® Masonry Mat over the insulation with a maximum 1" air gap between the CavClear® and the cladding. When CavClear® is used, this may only be used with Cladding 1, 2, 3, 4, 5 or 6 or with thin brick/thin stone adhered to stucco as long as the total thickness is 3/4" min.

Table 5. Approved NFPA 285 Wall Assemblies with R2+ BASE as Exterior Insulation[1,2,3]

Wall Component	Materials
Exterior Cladding Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 17 Item 9 may use any tested/approved installation technique. Items 10, 11 or 14 may use any standard installation technique.	1. Brick – Nominal 4" thick, clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick ties/Anchors 24" o.c. (max.). 2. Stucco – Minimum 3/4" thick, exterior cement plaster and lath. For systems that require a more durable WRB system, any building wrap or 15# felt that meets requirement #11 in WRB Over Exterior Insulation (**Table 6**) can be used as a slip sheet between the WRB/exterior insulation and the lath. 3. Limestone – Minimum 2" thick using any standard non-open joint installation technique such as shiplap. 4. Natural Stone Veneer – Minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone. 5. Cast Artificial Stone – Minimum 1 1/2" thick using any standard non-open joint installation technique such as shiplap. 6. Terra Cotta Cladding – Minimum 1 1/4" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap. 7. Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Minimum 3/4". For these systems, which require a more durable WRB system, any building wrap or 15# felt that meets requirement #11 in WRB Over Exterior Insulation (**Table 6**) can be used as a slip sheet between the WRB/AVP and the lath. 8. TABS II Panel System with 1/2" thick bricks using TABS Wall Adhesive. 9. Any MCM that has successfully passed NFPA 285. 10. Uninsulated sheet metal building panels including steel, copper, aluminum. 11. Uninsulated fiber-cement siding. 12. Stone/Aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria. 13. Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria. 14. Terra Cotta Cladding – Any rain-screen Terra Cotta (min. 1/2" thick) with ventilated shiplap. 15. 1/2" Stucco – any one coat stucco (1/2" min.) which meets AC11 acceptance criteria or is approved for use in Type I-IV construction or has been tested per NFPA 285 or stays in place when tested per ASTM E119 (stucco exposed to fire) for at least 30 minutes. 16. Natural Stone Veneer – minimum 1 1/4" thick using any standard installation technique. 17. FunderMax M.Look Grey Core – minimum 1/4" thick using any standard installation technique

SI: 1 in = 25.4 mm

1. The assemblies' combinations created herein and the various substitutions of products are based on testing and professional thermal engineering analysis by Priest and Associates.
2. Acceptance criteria for ASTM E1354 testing have not been well established in the referenced building codes and foam sheathing related sections. The criteria stated here for substitution of products is based on testing and professional thermal engineering analysis by Priest and Associates.
3. T_{ign} is the time to ignition from the start of the test until the sheathing ignites. Pk. HRR is the peak heat release rate during the test.

Table 6. Allowable NFPA 285 WRB Materials with R2+ MATTE, SILVER, & BASE[1,2,3,4]

Wall Component	Materials
WRB Over Base Wall Surface Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 or None. ***Note:*** Some WRBs are only allowed with specific systems. Item 24 (Securock® Exoair® 430) or 25 (DensElement w/ FastFlash) replaces the exterior sheathings in **Table 5** through **Table 7**. When either of these items are used, do not use exterior sheathings listed in Tables 5-8 or WRB's on base wall surface in this table.	1. Hunter Xci VP-SA WRB 2. Carlisle® Fire Resist 705 VP, Fire Resist 705 FR-A, Fire Resist Barritech NP, Fire Resist Barritech VP (or VP LT). Fire Resist 705 VP may be used with 702 WB, Cav-Grip, or Low VOC Travel-Tack adhesives. Fire Resist FR-A may be used with CCW 702, 702LV, 702 WB, CAV-Grip, and Low VOC Travel-Tack adhesives. 3. GE Momentive SEC 2500 SilShield 4. Vaproshield Wrapshield SA, RevealShield SA 5. WR Grace Perm-A-Barrier® VPS, Perm-A-Barrier® NPL (AKA: PAB NP20), Perm-A-Barrier® VPL, Perm-A-Barrier® Aluminum Wall Membrane 6. StoGuard Vaporseal 7. 3M 3015 (with Hold Fast 70 adhesive @ 6 mils) 8. Henry Air-Bloc 21S, AB 33, AB 31 or AB 17. AB 32MR may be used only with R2+ SILVER, MATTE or BASE 9. Tyvek CommercialWrap or CommercialWrap D. Fluid Applied WB may be used only with R2+ SILVER, MATTE or BASE 10. PolyGuard Air Lok Flex VP or FlexGuard. Air Lok Flex may be used only with claddings 1-6 11. Prosoco R-Guard Cat 5, R-Guard Cat 5 Rainscreen, R-Guard VB or R-Guard Spray Wrap MVP 12. Dryvit Backstop NT 13. WR Meadows Air Shield LMP (Gray), Air Shield LMP (Black), Air Shield TMP, Air Shield LSR 14. Cosella-Dörken Products, Inc., Delta-Vent SA, Delta-Vent S, Delta-Fassade S, Delta Maxx 15. Any WRB that has been tested per ASTM E1354 (at a minimum of 20 kW/m^2 heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR) than those listed above. 16. BASF Enershield HP or Enershield I 17. Soprema Sopraseal Stick VP, Soprasolin HD, Stick 1100T with Elastacool 600c Primer (for use with R2+ SILVER, MATTE or BASE) 18. Pecora XL Perm Ultra VP 19. Siga Majvest or Majvest 500 SA 20. Sto Gold Coat or Emerald Coat 21. Tremco ExoAir 230 and ExoAir 130 22. Fortifiber Building Systems Group WeatherSmart Housewrap, WeatherSmart Drainable, WeatherSmart Commercial or Super Jumbo Tex 60 23. USG Securock® Exoair® 430 System – see note on left and Air/Vapor System sections in **Table 5** through **Table 7**. 24. $^5/_8$" Georgia Pacific DenElement, flashed with Prosoco R-Guard FastFlash on sheathing joints. 25. Dow Corning Dowsil DefendAir200 26. Hohmann & Barnard Enviro Barrier and Enviro Barrier VP 27. STS FW100 or FW100A 28. Karnak 321 K-NRG 29. NaturaSeal AirSeal NS-A-250LP, AirSeal NS-A-250HP 30. Jumpstart HWW-65A, HWW-65B, HWHP-80A, HWMP-90A, HWD2-72A, HWHPT-92A, HWMPC-105A 31. Master Wall Rollershield 32. Parex WeatherSeal Spray & Roll-On

Table 6. Allowable NFPA 285 WRB Materials with R2+ MATTE, SILVER, & BASE[1,2,3,4]

Wall Component	Materials
WRB Over Exterior Insulation Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 or None. ***Note:*** Some WRBs are only allowed with specific systems Insulation Joints may be taped with Foil-Grip 1402, 4" width (max.)	1. Hunter Xci VP-SA WRB 2. Carlisle® Fire Resist 705 VP (with 702 WB, Cav-Grip, or Low VOC Travel-Tack adhesives), Fire Resist 705 FR-A (with CCW 702, 702LV, 702 WB, CAV-Grip, and Low VOC Travel Adhesives), Fire Resist Barritech VP (or VP LT), Fire Resist Barritech NP 3. GE Momentive SEC 2500 SilShield 4. Vaproshield Wrapshield SA, RevealShield SA 5. WR Grace Perm-A-Barrier® NPL (AKA: PAB NP20), Perm-A-Barrier® VPL, Perm-A-Barrier® Aluminum Wall Membrane 6. Henry Air-Bloc 21S, AB 33, AB 31 or AB 17, 7. Tyvek CommercialWrap. 8. PolyGuard Air Lok Flex VP, FlexGuard, Air Lok Flex (only with claddings 1-6) (**Table 4**) 9. Prosoco R-Guard Cat 5, R-Guard Cat 5 Rainscreen, R-Guard VB or R-Guard Spray Wrap MVP 10. Sto Gold coat 11. Dryvit Backstop NT 12. Any WRB that has been tested per ASTM E1354 (at a minimum of 20 kW/m^2 heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR) than those listed above 13. 3" Aluma-GRIP 701 or 4" FG-1402 joint tape may be interchanged. (Hardcast AFT is a rebrand of Aluma-GRIP 701) 14. WR Meadows Air Shield LMP (Gray), Air Shield LMP (Black), Air Shield TMP, Air Shield LSR 15. Cosella-Dörken Products, Inc., Delta-Vent SA, Delta-Vent S, Delta-Fassade S, Delta Maxx 16. Soprema Sopraseal Stick VP, Soprasolin HD 17. Pecora XL Perm Ultra VP 18. Siga Majvest (for all claddings) or Majvest 500 SA (only with Claddings 1-6) 19. Fortifiber Building Systems Group WeatherSmart Housewrap, WeatherSmart Drainable or WeatherSmart Commercial 20. Dow Corning Dowsil DefendAir 200 21. Hohmann & Barnard Enviro Barrier VP 22. STS FW100A 23. Karnak 321 K-NRG 24. Jumpstart HWW-65A, HWW-65B, HWHP-80A, HWMP-90A, HWD2-72A, HWHPT-92A, HWMPC-105A 25. Master Wall Rollershield 26. Parex WeatherSeal Spray & Roll-On

SI: 1 in = 25.4 mm

1. The following adhesives may be used for attachment of the polyisocyanurate (polyiso) insulation:
   a. Adhesive applied discontinuously at a rate of 3/8" x 3" dabs, 16" o.c.: LM 800 XL, or BarriBond or BarriBond XL
   b. Aerosol adhesive at the application rate as per mfg. instructions: CAV-Grip™ or Low VOC Travel-Tack
2. The following may be used as gap filler between insulation panels: FOMO HandiFoam FireBlock and TVM FireBlock.
3. These CCW detailing materials may be used over the base wall assembly. The detailing materials can be used alone or with any approved WRB for the construction.
   a. Board Joint Treatments:
      i. 2" x 40 mil ribbon of BarriBond or BarriBond XL
      ii. 4" DCH Reinforcing Rabric embedded in Fire-Resist Barritech VP/NP/NP LT or embedded in Fire Resist Barrithane VP
      iii. 4" Foil-GRIP 1402 (with surface preparation as recommended by CCW using CCW-702, CCW-702 LV, CCW-702 WB, CCW-715, Low VOC Travel-Tack, CAV-Grip, HP 250 Primer, or Low VOC EPDM Primer per instructions on Product Data Sheet)
      iv. 4" AlumaGRIP 701 (with surface preparation as recommended by CCW using CCW-702, CCW-702 LV, CCW-702 WB, CCW-715, Low VOC Travel-Tack, CAV-Grip, HP 250 Primer, or Low VOC EPDM Primer per instructions on Product Data Sheet)
   b. Termination Mastic for Flashing/Membrane: 1" x 40 mil ribbon or tooled 3/8" bead of SURE-SEAL Lap Sealant, CCW-704, LM 800 XL, BarriBond, or BarriBond XL

Table 6. Allowable NFPA 285 WRB Materials with R2+ MATTE, SILVER, & BASE[1,2,3,4]

Wall Component	Materials
	c. Detail Flashing, 3" on each side, at Openings, Terminations, Penetrations, Transitions and Angle Changes. i. CCW-705/XLT, CCW-705 TWF/XLT, or Fire Resist 705 FR-A/XLT (all with surface preparation as recommended by CCW using CCW-702, CCW-702 LV, CCW-702 WB, CCW-715, Low VOC Travel-Tack, CAV-Grip, HP 250 Primer, or Low VOC EPDM Primer per instructions on Product Data Sheet) ii. SURE-SEAL P/S Elastoform or SURE-SEAL P/S Cover Strip (both with surface preparation as recommended by CCW using CCW-702, CCW-702 LV, CCW-702 WB, CCW-715, Low VOC Travel-Tack, CAV-Grip, HP 250 Primer or Low VOC EPDM Primer per instructions on Product Data Sheet) iii. LiquiFiber or DCH Reinforcing Fabric embedded in Barritech VP/NP/NP LT iv. 40 mil application of BarriBond, BarriBond XL, or Barrithane VP 4. These CCW detailing materials may be used over the polyiso insulation and can be use alone or with any approved WRB for the assembly. a. Board Joint Treatments: i. 2" x 40 mil ribbon of BarriBond or BarriBond XL ii. 4" DCH Reinforcing Rabric embedded in Fire-Resist Barritech VP/NP/NP LT or embedded in Fire Resist Barrithane VP iii. 4" Foil-GRIP 1402 (with surface preparation as recommended by CCW using CCW-702, CCW-702 LV, CCW-702 WB, CCW-715, Low VOC Travel-Tack, CAV-Grip, HP 250 Primer or Low VOC EPDM Primer per instructions on Product Data Sheet) iv. 4" AlumaGRIP 701 (with surface preparation as recommended by CCW using CCW-702, CCW-702 LV, CCW-702 WB, CCW-715, Low VOC Travel-Tack, CAV-Grip, HP 250 Primer or Low VOC EPDM Primer per instructions on Product Data Sheet) b. Termination Mastic for Flashing/Membrane: 1" x 40 mil ribbon or tooled 3/8" bead of SURE-SEAL Lap Sealant, LM 800 XL, BarriBond or BarriBond XL c. Detail Flashing, 3" on each side, at Openings, Terminations, Penetrations, Transitions and Angle Changes. i. Fire Resist 705 FR-A/XLT (with surface preparation as recommended by CCW using CCW-702, CCW-702 LV, CCW-702 WB, CCW-715, Low VOC Travel-Tack, CAV-Grip, HP 250 Primer, or Low VOC EPDM Primer per instructions on Product Data Sheet)

6.2.5 *Special Approval – 2012 IBC (or Earlier):*

6.2.5.1 R2+ Products have been tested in accordance with NFPA 285, which is a full-scale fire test that evaluates the use of foam plastics in exterior wall assemblies using actual end use configurations. See **Section 6.2.5** and the evaluations listed in **Section 10**.

6.2.5.2 Special approval by large-scale testing is allowed by 2012 IBC Section 2603.10, which states:

> **2603.10 Special approval**. Foam plastic shall not be required to comply with the requirements of Sections 2603.4 through 2603.8 where specifically approved based on large-scale tests such as, but not limited to, NFPA 286 (with the acceptance criteria of Section 803.2), FM 4880, UL 1040 or UL 1715. Such testing shall be related to the actual end-use configuration and be performed on the finished manufactured foam plastic assembly in the maximum thickness intended for use. Foam plastics that are used as interior finish on the basis of special tests shall also conform to the flame spread and smoke-developed requirements of Chapter 8. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

6.2.5.2.1 The testing listed in this section (NFPA 286, FM 4880, UL 1040 or UL 1715) are all tests that evaluate the potential for fire growth of combustible interior finishes.

6.2.5.2.2 Since R2+ Products are not intended for use as interior finishes, these are not appropriate end use tests.

6.2.5.2.3 This section allows the use of other larger-scale tests. NFPA 285 is a large-scale test that evaluates the wall assembly in fire conditions after flashover occurs, subjecting the wall assembly to more severe fire conditions than the listed tests, and it is indicative of the end-use conditions.

6.2.5.2.4 This special approval exempts a product from the need to comply with 2012 IBC Section 2603.4 through 2012 IBC Section 2603.8. This includes the exemption from 2012 IBC Section 2603.5.4, which requires a flame spread rating of 25 or less.

6.2.5.2.5 R2+ SILVER and R2+ MATTE are not interior finish materials and are covered by a minimum 1/2" gypsum wallboard, which meets the requirements of 2012 IBC Section 2603.5.2 for thermal barriers.

6.2.5.2.6 There is no flame spread requirement in 2012 IBC Chapter 8 that applies to foam plastics used as insulation inside exterior non-load bearing wall assemblies in which foam is covered by a thermal barrier.

6.2.5.2.7 Based upon the above analysis and interpretation, R2+ SILVER meets the requirements of 2012 IBC Section 2603.10, which specifically exempts the foam from the requirement of 2012 IBC Section 2603.5.4, which requires a flame spread rating of 25 or less.

6.2.5.2.8 R2+ BASE integrates FRT plywood which has a flame spread rating of 25 or less, and has been tested in accordance with NFPA 285 which, per the above analysis, allows it to meet the requirements of 2012 IBC Section 2603.10.

6.2.6 *Special Approval – 2015 IBC:*

6.2.6.1 R2+ Products have been tested in accordance with NFPA 285, which is a full-scale fire test that evaluates the use of foam plastics in exterior wall assemblies using actual end use configurations. See **Section 6.2.5** and the evaluations listed in **Section 10**.

6.2.6.2 Special approval by large-scale testing is allowed by 2015 IBC Section 2603.9, which states:

> **2603.9 Special approval**. Foam plastic shall not be required to comply with the requirements of Section 2603.4 or those of Section 2603.6 where specifically approved based on largescale tests such as, but not limited to, NFPA 286 (with the acceptance criteria of Section 803.2), FM 4880, UL 1040 or UL 1715. Such testing shall be related to the actual end-use configuration and be performed on the finished manufactured foam plastic assembly in the maximum thickness intended for use. Foam plastics that are used as interior finish on the basis of special tests shall also conform to the flame spread and smoke-developed requirements of Chapter 8. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

6.2.6.2.1 The testing listed in this section (NFPA 286, FM 4880, UL 1040 or UL 1715) are all tests that evaluate the potential for fire growth of combustible interior finishes.

6.2.6.2.2 Since R2+ Products are not intended for use as interior finishes, these are not the appropriate end-use tests for these applications.

6.2.6.2.3 This section allows the use of other larger-scale tests. NFPA 285 is a large-scale test that evaluates the wall assembly in fire conditions after flashover occurs, and it is indicative of the end use conditions.

6.2.6.2.4 This special approval exempts a product from the need to comply with 2015 IBC Section 2603.4 and 2015 IBC Section 2603.6. This change in the code language from the 2012 version does not include the exemption from 2015 IBC Section 2603.5.4, which requires a flame spread rating of 25 or less.

6.2.6.2.5 R2+ Products are not interior finish materials and shall be covered with a minimum 1/2" gypsum wallboard, which meets the requirements of 2015 IBC Section 2603.5.2 for thermal barriers.

6.2.6.2.6 There is no flame spread requirement in 2015 IBC Chapter 8 that applies to foam plastics used as insulation inside exterior non-load bearing wall assemblies in which foam is covered by a thermal barrier.

6.2.6.2.7 The foam plastic materials in R2+ Products do not have a flame spread index of 25 or less as required by 2015 IBC Section 2603.5.4. However, they have met the intent of the code by showing that in their end use configuration they meet the requirements of the NFPA 285 assembly test and are, for the assemblies defined herein, equivalent to assemblies containing foam plastics with a flame spread of 25 or less.

6.2.6.2.8 Based upon the above analysis and interpretation, R2+ Products meet the requirements of 2015 IBC Section 2603.9 when installed in accordance with the provisions of this report.

6.2.7 *Special Approval – 2018 IBC:*

6.2.7.1 R2+ Products have been tested in accordance with NFPA 285-12, which is a full-scale fire test that evaluates the use of foam plastics in exterior wall assemblies using actual end use configurations. See **Section 6.2.5** and the evaluations listed in **Section 10**.

6.2.7.2 Special approval by large-scale testing is allowed by IBC Section 2603.9, which states:

> **2603.9 Special approval**. Foam plastic shall not be required to comply with the requirements of Section 2603.4 or those of Section 2603.6 where specifically approved based on large-scale tests such as, but not limited to, NFPA 286 (with the acceptance criteria of Section 803.1.1.1), FM 4880, UL 1040 or UL 1715. Such testing shall be related to the actual end-use configuration and be performed on the finished manufactured foam plastic assembly in the maximum thickness intended for use. Foam plastics that are used as interior finish on the basis of special tests shall conform to the flame spread and smoke-developed requirements of Chapter 8. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

6.2.7.2.1 The testing listed in this section (NFPA 286, FM 4880, UL 1040 or UL 1715) are all tests that evaluate the potential for fire growth of combustible interior finishes.

6.2.7.2.2 Since R2+ Products are not intended for use as interior finishes, these are not the appropriate end-use tests for these applications.

6.2.7.2.3 This section allows the use of other larger-scale tests. NFPA 285 is a large-scale test that evaluates the wall assembly in fire conditions after flashover occurs, and it is indicative of the end use conditions.

6.2.7.2.4 This special approval exempts a product from the need to comply with IBC Section 2603.4 and IBC Section 2603.6. This change in the code language from the 2012 version does not include the exemption from IBC Section 2603.5.4, which requires a flame spread rating of 25 or less.

6.2.7.2.5 R2+ Products are not interior finish materials and shall be covered with a minimum ½" gypsum wallboard, which meets the requirements of IBC Section 2603.5.2 for thermal barriers.

6.2.7.2.6 There is no flame spread requirement in IBC Chapter 8 that applies to foam plastics used as insulation inside exterior non-load bearing wall assemblies in which foam is covered by a thermal barrier.

6.2.7.2.7 The foam plastic materials in R2+ Products do not have a flame spread index of 25 or less as required by IBC Section 2603.5.4. However, they have met the intent of the code by showing that in their end use configuration, they meet the requirements of the NFPA 285 assembly test and are for the assemblies defined herein, equivalent to assemblies containing foam plastics with a flame spread of 25 or less.

6.2.7.2.8 Based upon the above analysis and interpretation, R2+ Products meet the requirements of IBC Section 2603.9 when installed in accordance with the provisions of this report.

6.3 *Air Barrier*

6.3.1 R2+ MATTE may be used as an air barrier material as prescribed in IECC Section C402.5.1 in accordance with ASTM E2178.

6.3.2 Air permeability test results can be viewed in **Table 7**.

Table 7. Air Permeability[1]

Product Name	Air Pressure	Air Permeability
R2+ MATTE	75 Pa	< 0.02 L/(s·m²)

Imperial Units: 1 Pa = 0.021 psf, 1 L/(s·m²) = 0.2 cfm/ft²

1. Foam core tested in accordance with ASTM E2178. Air pressure and permeability numbers shown represent R2+ MATTE compliance and are not intended to represent the performance under actual conditions.

6.4 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.

7 Certified Performance[25]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[26]

7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.[27]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 R2+ Products comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Performance for use in exterior walls of buildings of any height and of Type I-IV construction in accordance with IBC Section 2603.5

8.1.2 Performance in accordance with ASTM E84 for flame spread and smoke-developed index ratings in accordance with IBC Section 2603.3 and IBC Section 2603.5.4

8.1.3 Performance for use without a thermal barrier in accordance with the provisions in IBC Section 2603.9 as specified in IBC Section 2603.5.2

8.1.4 Performance with regards to the potential heat generated by the FPIS in accordance with IBC Section 2603.5.3

8.1.5 Performance with regard to vertical and lateral fire propagation in accordance with 2018 IBC Section 2603.5.5

8.1.6 Performance relating to ignition in accordance with IBC Section 2603.5.7

8.2 R2+ MATTE was evaluated for use as an air impermeable insulation (air barrier material) as provided by IECC Section C402.5.1.

8.3 Wind pressure resistance in accordance with IBC Section 2603.10 and IRC Section R316.8 is outside the scope of this evaluation.

8.3.1 Fire-resistance-rated wall assemblies in accordance with IBC Section 2603.5.1 are outside the scope of this evaluation.

8.4 Any building code, regulation and/or accepted engineering evaluations (i.e., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP/approved sources. DrJ is qualified[28] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.

8.5 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.

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

9 Installation

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

9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.

9.3 *Installation Procedure*

9.3.1 This section provides general guidelines for the installation of R2+ Products only. Refer to the manufacturer installation instructions in addition to this report, for complete details and requirements.

9.3.1.1 Protect surrounding areas and surfaces from damage.

9.3.1.2 If wall assembly design calls for WRB installed over the base wall, ensure that WRB is one of those identified in **Table 3**, and WRB is installed correctly and in good condition before covering with FPIS.

9.3.1.3 FPIS shall not be applied over walls while they are vulnerable to water intrusion from above or behind.

9.3.1.4 Do not block flashing, weeps or other drainage paths with FPIS.

9.3.1.5 Do not span expansion joints with FPIS.

9.3.1.6 During installation, take precautions to minimize moisture intrusion behind insulation.

9.3.1.7 Beginning at the base of the wall, apply FPIS horizontally or vertically using maximum board lengths to minimize number of joints.

9.3.1.8 Pre-cut FPIS to fit openings and penetrations.

9.3.1.9 Offset FPIS board joints a minimum of 6". Do not form 4-corner intersections.

9.3.1.10 Form a "*corner lock*" pattern by staggering vertical joints at inside and outside corners.

9.3.1.11 Fill gaps greater than $^1/_8$" between FPIS boards with expanding spray foam or butter edge of board with approved sealant, and strike flush. Expanding spray foam may also be applied onto the FPIS board edges during installation.

9.3.1.12 Verify all materials are installed in accordance with current Carlisle Coatings & Waterproofing, Inc. published literature and local code requirements.

9.3.1.13 Additional information on the installation and detailing of R2+ SILVER, R2+ MATTE and R2+ BASE can be found at www.carlisleccw.com.

9.3.2 This section provides additional general guidelines for the installation of R2+ SILVER and R2+ MATTE only. Refer to the manufacturer installation instructions, in addition to this report, for complete details and requirements.

9.3.2.1 Cut with a knife using a square to guide the cut, or use a table saw.

9.3.2.2 Abut all joints tightly and ensure an overall flush, level surface.

9.3.2.3 Mechanically fasten using the fastening pattern as indicated.

9.3.2.4 Space fasteners 12" o.c. at the perimeter and 16" o.c. in the field.

9.3.2.5 Set back perimeter fasteners $^{3}/_{8}$" from board edges.

9.3.2.6 ***Note:*** Where R2+ SILVER or R2+ MATTE are installed by the same trade as the cladding or in close cooperation with that trade, cladding attachment hardware can supplement or replace the insulation fasteners and insulation adhesive. Cladding fasteners fulfilling the R2+ SILVER or R2+ MATTE attachment function shall be designed for this function. If the cladding attachment is 16" o.c. or closer, and it tightly secures the insulation, no additional fastening or adhesive is required.

9.3.3 When adhesive is used, periodically verify adhesion. Properly installed adhesively applied R2+ SILVER or R2+ MATTE will cohesively break the adhesive while still wet and destroy the substrate when dry.

9.3.4 Consult the detailed manufacturer installation instructions for the proper adhesive pattern to maintain the drainage plane.

9.3.5 This section provides additional general guidelines for the installation of R2+ BASE only. Refer to the manufacturer installation instructions and this report, for complete details and requirements.

9.3.5.1 Provide separation of the edge of R2+ BASE from concrete at grade with pressure-treated lumber sill plate, sill gasket or non-permeable flashing material.

9.3.5.2 Begin at base of wall from a firm, permanent support.

9.3.5.3 Fasten R2+ BASE with proper fasteners and spacing to accommodate design. Fasten R2+ BASE to the structure using SIPs fasteners or similar hardware driven into steel studs, wood studs, concrete or CMU substrate. Fastening shall be approved by a structural engineer, as the fastening must be sufficient to support both the weight of the R2+ BASE and the weight of the cladding for the project conditions.

9.3.5.4 Allow a minimum $^{1}/_{8}$" and a maximum $^{1}/_{4}$" gap between R2+ BASE boards to accommodate hydric movement of wood. Fasten boards tightly to provide a flush, level surface.

9.3.5.5 Apply WRB from approved list in **Table 6**, over plywood side of R2+ BASE according to WRB manufacturer instructions.

10 Substantiating Data

10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

10.1.1 Flame spread and smoke developed index testing in accordance with ASTM E84

10.1.2 Fire performance criteria testing in accordance with NFPA 285

10.1.3 Potential heat testing in accordance with NFPA 259

10.1.4 Air permeance testing in accordance with ASTM E2178

10.2 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.

10.3 Where applicable, 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 to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability and safety.

10.4 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 this duly authenticated report, may be dependent upon published design properties by others.

10.5 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.[29]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for R2+ Products on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, R2+ Products have performance characteristics that were tested and/or meet applicable regulations and are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, R2+ Products shall be approved for the following applications:

11.2.1 R2+ Products are approved for use in exterior walls of buildings of Type I-IV construction in accordance with IBC Section 2603.5.

11.2.2 R2+ Products are approved for use in wall assemblies meeting the requirements of NFPA 285 testing when constructed in accordance with **Table 3**, **Table 4**, **Table 5** and **Table 6**.

11.2.3 R2+ Products described in this report comply with or are a suitable alternative to, the applicable sections of the codes listed in **Section 4**.

11.2.4 R2+ MATTE may be used as an air barrier material in exterior wall assemblies as denoted in **Section 6.3**.

11.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Carlisle Coatings & Waterproofing, Inc.

11.4 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[30] are similar) in pertinent part states:

> **104.11 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. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.

11.5 **Approved**:[31] Building regulations require that the building official shall accept duly authenticated reports.[32]

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

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

11.5.3 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.

11.6 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.

11.7 Through the IAF Multilateral Agreements (MLA), this duly authenticated report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 duly authenticated reports are equivalent.[33]

12 Conditions of Use

12.1 Material properties shall not fall outside the boundaries defined in **Section 6**.

12.2 As defined in **Section 6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

12.3 This report and the installation instructions, when required by a code official, shall be submitted at the time of permit application.

12.4 R2+ Products are approved for use in exterior walls of buildings of any height and of Type I, II, III or IV construction as described in **Table 3**, **Table 4**, **Table 5** and **Table 6**.

12.5 R2+ BASE may be used as a structural nailing base for claddings.

12.6 When installed in areas where the probability of termite infestation is designated as "*very heavy*", installation shall meet the requirements of IBC Section 2603.8.

12.7 R2+ Products are manufactured in Montgomery, New York; Tooele, Utah; Terrell, Texas; Smithfield, Pennsylvania' Franklin Park, Illinois; Puyallup, Washington and Lake City, Florida under a quality control program with quality control inspections in accordance with IBC Section 110.3.10[34] and IBC Section 110.3.11.[35]

12.8 The wall assemblies listed in **Table 3**, **Table 4**, **Table 5** and **Table 6** are based on compliance to the fire provisions of the codes listed in **Section 4**. Consideration of wall assembly performance with regard to other attributes, such as water vapor control, condensation, energy code requirements, etc. are outside the scope of this report.

12.9 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:

12.9.1 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.

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

12.9.3 These innovative products have an internal quality control program and a third-party quality assurance program.

12.9.4 At a minimum, these innovative products shall be installed per **Section 9** of this report.

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

12.9.6 These innovative products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4 and IRC Section R109.2.

12.9.7 The application of these innovative 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.

12.10 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 104.11*," all of IBC Section 104, and IBC Section 105.4.

12.11 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).

12.12 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.

13 Identification

13.1 The innovative products listed in **Section 1.1** are identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number and other information to confirm code compliance.

13.2 Additional technical information can be found at www.carlisleccw.com.

14 Review Schedule

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

14.2 For information on the status of this report, please contact DrJ Certification.

15 Approved for Use Pursuant to U.S. and International Legislation Defined in Appendix A

15.1 R2+ Products: R2+ SILVER, R2+ MATTE and R2+ BASE are included in this report published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services. This report states either that the material, product or service meets recognized standards or has been tested and found suitable for a specified purpose. This report meets the legislative intent and definition of being acceptable to the AHJ.

Appendix A

1 Legislation that Authorizes AHJ Approval

1.1 **Fair Competition**: State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:

1.1.1 Advance innovation

1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints

1.1.3 Benefit consumers through lower prices, better quality, and greater choice

1.2 **Adopted Legislation**: The following local, state and federal regulations affirmatively authorize these innovative products to be approved by AHJs, delegates of building departments and/or delegates of an agency of the federal government:

1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies, and/or methods of construction. The goal is to "*protect economic freedom and opportunity by promoting free and fair competition in the marketplace*."

1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.

1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),[36] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years[37] and/or a $5,000,000 fine or 3 times the value of[38] the Intellectual Property (IP) and Trade Secrets (TS).

1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of Listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.

1.2.4 For new materials[39] that are not specifically provided for in any regulation, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.

1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.[40]

1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence provided in writing, that specific legislation have been violated by an individual registered PE.

1.2.7 The AHJ shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.[41]

1.3 **Approved**[42] **by Los Angeles**: The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards that apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.[43] The Superintendent of Building Approved Testing Agency Roster is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a DrJ Listing are LAMC approved. In addition, the Superintendent of Building shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.[44]

1.4 **Approved by Chicago**: The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).

1.5 **Approved by New York City**: The 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed[45] an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement[46] (i.e., ANAB, International Accreditation Forum also known as IAF, etc.).

1.6 **Approved by Florida**: Statewide approval of products, methods or systems of construction shall be approved, without further evaluation by:

1.6.1 A certification mark or listing of an approved certification agency,

1.6.2 A test report from an approved testing laboratory,

1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or

1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.

1.6.5 For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods:

1.6.5.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,

1.6.5.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,

1.6.5.3 A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code,

1.6.5.4 A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code, or

1.6.5.5 A statewide product approval issued by the Florida Building Commission.

1.6.6 The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642), and as a Florida Registered Engineer (i.e., ANE13741).

1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA])**: A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation 553.842 and 553.8425.

1.8 **Approved by New Jersey**: Pursuant to the 2018 Building Code of New Jersey in IBC Section 1707.1 General,[47] it states: "*In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)*".[48] Furthermore N.J.A.C 5:23-3.7 states: "*Municipal approvals of alternative materials, equipment, or methods of construction*."

1.8.1 **Approvals**: Alternative materials, equipment or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations.

1.8.1.1 A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.8.1.2 Reports of engineering findings issued by nationally recognized evaluation service programs such as but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.8.2 The New Jersey Department of Community Affairs has confirmed that technical evaluation reports, from any accredited entity listed by ANAB, meets the requirements of item the previous paragraph, given that the listed entities are no longer in existence and/or do not provide "*reports of engineering findings*."

1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards**: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[49] and Part 3280,[50] the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:

1.9.1 "*All construction methods shall be in conformance with accepted engineering practices*."

1.9.2 "*The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur*."

1.9.3 "*The design stresses of all materials shall conform to accepted engineering practice*."

1.10 **Approval by US, Local and State Jurisdictions in General**: In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:

1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.[51]

1.10.2 For innovative alternatives and/or methods of construction, the building official shall accept duly authenticated reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.[52]

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

1.10.2.2 An approved source is "approved" when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[53]

1.10.3 The design strengths and permissible stresses of any structural material…shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.[54]

1.11 **Approval by International Jurisdictions**: The USMCA and GATT agreements provide for approval of innovative materials, designs, services, and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:

1.11.1 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.

1.11.2 **Approved**: The purpose of the MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA and subsequently, acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, designs, services, and/or methods of construction.

1.11.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.[55]

1.11.4 Therefore, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent.[56]

1.12 Approval equity is a fundamental commercial and legal principle.[57]

Notes

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

2 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#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 https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11

4 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as

5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice

6 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies

7 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2

8 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency

9 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source

10 https://www.law.cornell.edu/uscode/text/18/1832 (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and 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 https://www.cbitest.com/accreditation/

13 https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104:~:text=to%20enforce%20the%20provisions%20of%20this%20code

14 https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11:~:text=Where%20the%20alternative%20material%2C%20design%20or%20method%20of%20construction%20is%20not%20approved%2C%20the%20building%20official%20shall%20respond%20in%20writing%2C%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1:~:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%2C%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%2C%20stating%20the%20reasons%20therefore

15 https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11

16 https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

17 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

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

19 Unless otherwise noted, all references in this Listing are from the 2021 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.

20 References to NFPA 285-12 in this report are code compliant through the 2018 version of the IBC.

21 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#listed AND https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled

22 2015 IBC Section 1405.16

23 2015 IBC Section1405.16.1

24 2015 IBC Section 1405.16.2

25 https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4

26 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

27 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

28 Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

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

30 2018 IFC Section 104.9

31 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.

32 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1

33 Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

34 2018 IBC Section 110.3.9, 2015 IBC Section 110.3.8

35 2018 IBC Section 110.3.10, 2015 IBC Section 110.3.9

36 http://www.drjengineering.org/AppendixC AND https://www.drjcertification.org/cornell-2016-protection-trade-secrets

37 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years

38 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided

39 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2

40 IBC 2021, Section 1706.1 Conformance to Standards

41 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

42 See **Section 11** for the distilled building code definition of **Approved**

43 Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

44 https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

45 New York City, The Rules of the City of New York, § 101-07 Approved Agencies

46 New York City, The Rules of the City of New York, § 101-07 Approved Agencies

47 https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

48 https://www.nj.gov/dca/divisions/codes/codreg/ucc.html

49 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

50 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

51 IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.

52 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.

53 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/

54 IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.

55 https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

56 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

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