Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

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R2+® SHEATHE Air Barrier, Water-Resistive Barrier, and Fire Performance in Exterior and Interior Walls of Buildings of Type I-IV Construction

Trade Secret Report Holder:

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CSI Designations:

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 - Thermal Insulation

Section: 07 27 23 - Board Product Air Barriers

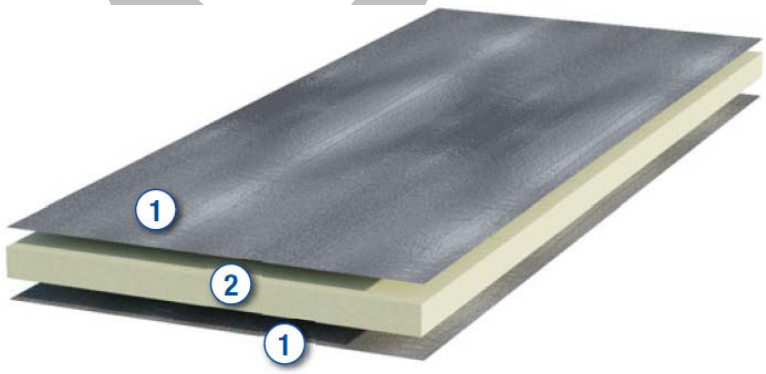
Section: 07 48 00 - Exterior Wall Assemblies

1 Innovative Product Evaluated[1]

1.1 R2+ SHEATHE

2 Product Description and Materials

2.1 The innovative product evaluated in this report is shown in **Figure 1**.



1 Glass-backed, reinforced aluminum foil facer

2 Closed cell polyisocyanurate foam core

Figure 1. R2+ SHEATHE

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2.2 R2+ SHEATHE is a proprietary Foam Plastic Insulating Sheathing (FPIS) product.

2.2.1 R2+ SHEATHE is a rigid insulation panel of a 20-psi or 25-psi closed cell polyisocyanurate insulation foam core with a glass-backed aluminum foil facers adhered to both sides.

2.2.1.1 R2+ SHEATHE conforms to ASTM C1289 Type I, Grade 2 (20-psi) or Grade 3 (25-psi).

2.3 *Material Availability*

2.3.1 *Thickness:*

2.3.1.1 1" (25 mm) through 3 1/2" (89 mm)

2.3.2 *Standard Product Width:*

2.3.2.1 48" (1,219 mm)

2.3.3 *Standard Product Lengths:*

2.3.3.1 96" (2,438 mm)

2.3.3.2 120" (3,048 mm)

2.3.3.3 144" (3,657 mm)

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

3 Definitions[2]

3.1 New Materials[3] 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.[4] The design strength and permissible stresses shall be established by tests[5] and/or engineering analysis.[6]

3.2 Duly authenticated reports[7] and research reports[8] are test reports and related engineering evaluations that are written by an approved agency[9] and/or an approved source.[10]

3.2.1 This report utilizes intellectual property and/or trade secrets to create public domain material properties for commercial end-use.

3.2.1.1 This report protects confidential Intellectual Property and trade secrets under the regulation, 18.US.Code.90, also known as Defend Trade Secrets Act of 2016 (DTSA).[11]

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

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional, hereinafter RDP) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[12]

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 RDP.

3.5.1 The Center for Building Innovation (CBI) is ANAB[13] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[14] 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[15] 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.[16]

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3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory. Therefore, recognition of certificates and validation statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope shall be approved.[17] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[18] and can be used in any country that is an MLA signatory found at this link: https://iaf.nu/en/recognised-abs/

3.9 Approval equity is a fundamental commercial and legal principle.[19]

4 Applicable Local, State, and Federal Approvals; Standards; Regulations[20]

4.1 *Local, State, and Federal*

4.1.1 Approved in all local jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured local jurisdictions: Austin, Baltimore, Broward County, Chicago, Clark County, Dade County, Dallas, Detroit, Denver, DuPage County, Fort Worth, Houston, Kansas City, King County, Knoxville, Las Vegas, Los Angeles City, Los Angeles County, Miami, Nashville, New York City, Omaha, Philadelphia, Phoenix, Portland, San Antonio, San Diego, San Jose, San Francisco, Seattle, Sioux Falls, South Holland, St. Louis County, Texas Department of Insurance, and Wichita.[21]

4.1.2 Approved in all state jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured states: California, Florida, New Jersey, Oregon, New York, Texas, Washington, and Wisconsin.[22]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[23] and Part 3280[24] pursuant to the use of ISO/IEC 17065 duly authenticated reports.

4.1.4 Approved means complying with the requirements of local, state, or federal legislation.

4.2 *Regulations*

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

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

4.2.3 *IECC – 18, 21, 24: International Energy Conservation Code®*

4.3 *Standards*

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

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

4.3.3 *ASTM E96: Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials*

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

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

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

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

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

4.3.9 *ASTM E2357: Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies*

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

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4.3.11 *NFPA 285-12: Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*

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

4.3.13 *UL 263: Standard for Fire Tests of Building Construction and Materials*

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

5 Listed[25]

5.1 Equipment, materials, products, or services included in a List published by a nationally recognized testing laboratory (e.g., CBI), an approved agency (e.g., CBI and DrJ), and/or an approved source (e.g., DrJ), or other organization(s) concerned with product evaluation (e.g., DrJ), that maintains periodic inspection (e.g., 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+ SHEATHE is an FPIS product complying with IBC Section 2603 and IRC Section R303.[26]

6.1.2 R2+ SHEATHE is used in exterior walls of buildings of any height and of Type I–IV construction in accordance with 2018 IBC Section 2603.5.

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

6.2 *Vapor-Retarding Insulated Sheathing*

6.2.1 R2+ SHEATHE was evaluated for use as a vapor retarder in accordance with ASTM E96 per IBC Section 202, IBC Section 1404.3, IRC Section R202, and IRC Section R702.7 and achieved a Vapor Retarder Class I (≤ 0.1 perm).

6.2.1.1 Per IBC Section 1404.3.1,[27] spray foam with a maximum permeance of 1.5 perms at the installed thickness applied to the interior side of wood structural panels, fiberboard, insulating sheathing, or gypsum shall be deemed to meet the continuous insulation moisture control requirement in accordance with one of the following conditions:

6.2.1.1.1 The spray foam R-value meets or exceeds the specified continuous insulation R-value.

6.2.1.1.2 The combined R-value of the spray foam and continuous insulation is equal to or greater than the specified continuous insulation R-value.

6.2.2 Water vapor permeance of R2+ SHEATHE is presented in **Table 1**.

Table 1. R2+ SHEATHE Water Vapor Permeance[1]

Product	Water Vapor Permeance (perm)		
	ASTM E96 A (Desiccant Method)	ASTM E96 B (Water Method)	Vapor Retarder Class
R2+ SHEATHE	< 0.1	< 0.1	Class I

SI: 1 perm = 57.2 ng/(Pa·s·m²)

1. Evaluated at a thickness of 1".

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6.3 *Air Barrier*

6.3.1 R2+ SHEATHE was evaluated in accordance with ASTM E2178 and ASTM E2357, and met the requirements of IRC Section N1101.10.5, IECC Section R303.1.5, IECC Section C402.6.2.3.1,[28] and IECC Section C402.6.2.3.2.[29]

6.3.1.1 R2+ SHEATHE is permitted for use as an air barrier material and an air barrier assembly when installed in accordance with the manufacturer installation instructions and this report, with all seams including the top and bottom edges taped. See **Table 2**.

Table 2. R2+ SHEATHE Air Barrier Properties[1,2]

Test Method	Air Barrier Performance
ASTM E2178	≤ 0.02 L/(s•m²) at 75 Pa
ASTM E2357	≤ 0.2 L/(s•m²) at 75 Pa

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

1. All seams and joints between boards shall be covered by 4" wide Henry, A Carlisle Company Foil-Grip™ 1402 pressure sensitive foil-faced flashing tape.
2. All fenestrations and penetrations shall be sealed with 9" wide Henry, A Carlisle Company Aluma-Grip™ 701 foil-faced self-adhering flashing tape with the top of the flashing sealed with butyl-based sealant.

6.4 *Water-Resistive Barrier*

6.4.1 R2+ SHEATHE may be used as a WRB as prescribed in IBC Section 1403.2 and IRC Section R703.2,[30] when installed on exterior walls as described in this section.

6.4.2 R2+ SHEATHE shall be installed horizontally or vertically with board joints placed directly over exterior framing spaced a maximum of 24" (610 mm) o.c. The fasteners used to attach the board shall be installed in accordance with **Section 9**.

6.4.3 All seams and joints between boards shall be covered by 4" wide Henry Foil Grip 1402 pressure sensitive foil-faced flashing tape.

6.4.4 A separate WRB may also be provided. If a separate WRB method is used, taping of the sheathing joints is not required.

6.4.5 Flashing of penetrations is required and shall comply with the applicable code.

6.5 *Fire Safety Performance*

6.5.1 *Surface Burning Characteristics:*

6.5.1.1 R2+ SHEATHE was evaluated to assess performance with regard to the flame spread and smoke developed index in accordance with ASTM E84. The results are shown in **Table 3**.

Table 3. Fire Performance[1]

Product Name	Flame Spread Index	Smoke-Developed Index	Classification
R2+ SHEATHE	≤ 25	< 250	Class A

1. Foam core tested in accordance with ASTM E84 (UL 723). Flame spread and smoke-developed indexes are shown for comparison purposes only and are not intended to represent the performance under actual fire conditions.

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6.5.2 *Ignition:*

6.5.2.1 R2+ SHEATHE was evaluated to assess performance with regard to ignition in accordance with IBC Section 2603.5.7.

6.5.2.2 R2+ SHEATHE complies with this section, when the exterior side of the sheathing is protected with one of the following materials:

6.5.2.2.1 A thermal barrier complying with IBC Section 2603.4.

6.5.2.2.2 A minimum 1" (25.4 mm) thickness of concrete or masonry.

6.5.2.2.3 Glass fiber reinforced concrete panels. Minimum thickness of $^3/_8$" (9.5 mm).

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

6.5.2.2.5 A minimum $^3/_8$" (9.5 mm) thickness of stucco complying with IBC Section 2510.

6.5.2.2.6 A minimum $^1/_4$" (6.35 mm) thickness of fiber cement siding complying with IBC Section 1404.17[31] and, IBC Section 1404.17.1[32] or IBC Section 1404.17.2.[33]

6.5.3 *Potential Heat:*

6.5.3.1 R2+ SHEATHE was tested in accordance with NFPA 259 to assess the potential heat generated by the FPIS in accordance with IBC Section 2603.5.3 and IRC Section R303.5.7,[34] as shown in **Table 4**.

Table 4. Potential Heat[1]

Product	Potential Heat (BTU/lb)
R2+ SHEATHE	11,587

SI: 1 BTU/lb = 0.0025 MJ/kg

1. Tested in accordance with NFPA 259.

6.5.4 *Vertical and Lateral Fire Propagation:*

6.5.4.1 R2+ SHEATHE was tested to assess its performance with regard to vertical and lateral fire propagation in accordance with NFPA 285 and 2018 IBC Section 2603.5.5.

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

6.5.4.3 The wall assemblies listed in **Table 5** and **Table 6** are approved for use in buildings of Type I–IV construction.

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Table 5. Approved NFPA 285 Assemblies with R2+ SHEATHE Exterior Insulation[1,2,3,4]

Wall Component	Materials
Base Wall System Use Option 1, 2, 3, or 4	1. Cast concrete walls 2. CMU concrete walls 3. 25-gauge minimum 3 5/8" (minimum) steel studs spaced 24" o.c. (maximum) a. 5/8" Type X gypsum wallboard interior b. Lateral bracing every 4' 4. Fire-Retardant Treated Wood (FRTW) studs: minimum nominal 2 x 4 dimension, spaced 24" o.c. (maximum) 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 any Option 1 – 15 *Note:* Items 8, 9, 10, and 11 may only be used with exterior sheathing[2]	1. None 2. 1 1/2" (minimum) of Covestro EcoBay CC SPF (up to full cavity thickness) 3. 1 1/2" (minimum) of 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 E13542 (at a minimum of 20 kW/m^2 heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR)[3] 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" (only with 1/2" [minimum] exterior gypsum sheathing) 10. SWD Urethane Quik-Shield 112 up to 6" (maximum) stud cavities with an air gap not exceeding 2 1/2" 11. 1 1/2" (minimum) 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" (minimum) exterior gypsum sheathing 13. Gaco (Firestone) F6500R, 052N, F4500, 183M, F1850, F1880 – 3 1/2" (maximum) 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" maximum thickness with no air gap, 6" maximum thickness with air gap) for use with 1/2" or thicker exterior gypsum sheathing
Exterior Sheathing Use Option 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" (minimum) FRTW structural panels in Type III construction

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Table 5. Approved NFPA 285 Assemblies with R2+ SHEATHE Exterior Insulation[1,2,3,4]

Wall Component	Materials
Multi-Function Sheathing and WRB Products Use Option 1 or 2	1. USG Securock® Exoair® 430 System – See note and Table 7 2. 5/8" Georgia Pacific DensElement, flashed with Prosoco R-Guard FastFlash on sheathing joints *Note:* Item 1 or 2 replaces the exterior sheathings above; when either of these items are used, do not use exterior sheathings or WRB on base wall surface in Table 7
WRB Over Base Wall Surface	1. See Table 7
Exterior Insulation	1. 3 1/2" thick (maximum) R2+ SHEATHE for all claddings 2. 4" thick R2+ SHEATHE for claddings 1 - 6
WRB Over Exterior Insulation	1. See Table 7 *Note:* 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" minimum
Exterior Cladding Use any Option 1 – 17 *Note:* Item 7 may use any tested/approved installation technique *Note:* 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. (maximum) 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 #9 in WRB over Exterior Insulation (Table 7) 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 passed NFPA 285 8. Uninsulated sheet metal building panels including steel, copper, and 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 (minimum 1/2" thick) with ventilated shiplap 13. 1/2" stucco – any one coat stucco (1/2" minimum) 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 which require a more durable WRB system, any building wrap or 15# felt that meets requirement #9 in WRB over Exterior Insulation (Table 7) 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

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Table 5. Approved NFPA 285 Assemblies with R2+ SHEATHE Exterior Insulation[1,2,3,4]

Wall Component	Materials
Exterior Cladding Continued	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.
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.
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.
4. See additional assembly details in the footnotes of Table 7.

Table 6. Approved NFPA 285 Wall Assemblies with R2+ SHEATHE Interior Insulation[1,4,5]

Wall Component	Materials
Base Wall System Use Option 1 or 2	1. Cast concrete walls (minimum 8" thick) 2. CMU concrete walls (minimum 8" thick)
Exterior Coating Use Option 1, 2, 3, or 4	1. Portland cement or lime stucco 2. Any ASTM E84 Class A Paint or Elastomeric Coating 3. Any ASTM E84 Class A Clear Sealer 4. None
Air/Vapor Barrier Membrane Position 1 over Base Wall Interior[2] *Note:* Some WRB are only allowed with specific systems	1. See Table 7 – NFPA 285 Allowable WRB Materials with R2+ SHEATHE
Continuous Insulation[5]	1. R2+ SHEATHE, maximum 3 1/2" thick
Air/Vapor Barrier Membrane Position 2 over Insulation[3]	1. See Table 7 - NFPA 285 Allowable WRB Materials with R2+ SHEATHE *Note:* Insulation Joints may be taped with Foil-Grip 1402, 4" width (maximum)
Interior Cladding	1. 5/8" type X interior gypsum sheathing installed directly over the insulation or installed to 3 5/8" studs (maximum depth) or Metal Hat, or Z Furring directly (no gap between stud/hat/Z and insulation). If an air gap between the stud/hat/Z and insulation is created, fire blocking with mineral wool per IBC Section 718 shall be installed. 2. Mass wall designs are assumed to use platform construction (concrete floor line intersects exterior concrete creating a firestop at floor lines). If the floor line is separated from the exterior concrete, fireblocking with mineral wool must be installed to prevent uncontrolled vertical flame spread.

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.
2. Position 1 – Air vapor barrier installed directly on interior side of the base wall system.
3. Position 2 – Air vapor barrier installed over continuous insulation on interior side of the wall assembly.
4. CCW Membrane Used in Position 1 or 2, not both.
5. R2+ SHEATHE insulation can be tacked in place with CAV-Grip® or Travel-Tack™ during installation. Follow instructions on product data sheet.

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Table 7. NFPA 285 Allowable WRB Materials with R2+ SHEATHE[1,2,3,4,5,6,7,8]

Wall Component	Materials
WRB Over Base Wall Surface Use any Option 1 – 33, or none *Note:* Some WRB are only allowed with specific systems. *Note:* Item 24 (Securock® Exoair® 430) or Item 25 (DensElement w/ FastFlash) replaces the exterior sheathings in Table 5. When either of these items are used, do not use exterior sheathings listed in Table 5, or WRB on base wall surface in this table.	1. Hunter Xci VP-SA WRB 2. Carlisle® Fire Resist 705 RS, Fire Resist Barrithane VP, 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. CCW-705 (with 702 LV, 702 WB, Cav-Grip, Low VOC Travel-Tack, or 702 adhesives may) can be used with R2+ SHEATHE, or unfaced noncombustible insulation and cladding options 1-6 (Table 5) 4. GE Momentive SEC 2500 SilShield, Elemax 2600 5. Vaproshield Wrapshield SA, RevealShield SA 6. WR Grace Perm-A-Barrier® VPS, Perm-A-Barrier® NPL (aka PAB NP20), Perm-A-Barrier® VPL, Perm-A-Barrier® Aluminum Wall Membrane (AWM), Perm-A-Barrier® VPL LT. The following may only be used with claddings 1-6 - Perm-A-Barrier® NPL 10, Perm-A-Barrier® VPL 50 7. StoGuard Vaporseal 8. 3M 3015 (with Hold Fast 70 adhesive at 6 mils) 9. Henry Air-Bloc 17MR, 21S, 31MR, 33MR, 16MR 10. Tyvek CommercialWrap or CommercialWrap D, Fluid Applied WB, only with Xci Ply (Class A) 11. PolyGuard Air Lok Flex VP, FlexGuard, Air Lok Flex (only with claddings 1 - 6) (Table 5) 12. Prosoco R-Guard Cat 5, R-Guard Cat 5 Rainscreen, R-Guard VB or R-Guard Spray Wrap MVP 13. Dryvit Backstop NT 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. 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 17. BASF Enershield HP or Enershield I 18. Soprema Sopraseal Stick VP, Soprasolin HD, Stick 1100T with Elastacool 600c Primer (for use with R2+ SHEATHE) 19. Pecora XL Perm Ultra VP 20. Siga Majvest or Majvest 500 SA 21. Sto Gold Coat or Emerald Coat 22. Tremco ExoAir 230 and ExoAir 130 23. Fortifiber Building Systems Group WeatherSmart Housewrap, WeatherSmart Drainable, WeatherSmart Commercial or Super Jumbo Tex 60 24. USG Securock® Exoair® 430 System – see note on left and Air/Vapor System sections in Table 6 25. $^5/_8$" Georgia Pacific DensElement, flashed with Prosoco R-Guard FastFlash on sheathing joints 26. Dow Corning Dowsil DefendAir™ 200 27. Hohmann & Barnard Enviro Barrier and Enviro Barrier VP 28. STS FW100 or FW100A 29. Karnak 321 K-NRG 30. NaturaSeal AirSeal NS-A-250LP, AirSeal NS-A-250HP 31. Jumpstart HWW-65A, HWW-65B, HWHP-80A, HWMP-90A, HWD2-72A, HWHPT-92A, HWMPC-105A 32. Master Wall Rollershield 33. Parex WeatherSeal Spray & Roll-On

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Table 7. NFPA 285 Allowable WRB Materials with R2+ SHEATHE[1,2,3,4,5,6,7,8]

Wall Component	Materials
WRB Over Exterior Insulation Use any Option 1 – 26, or none *Note:* Some WRB are only allowed with specific systems	1. Hunter Xci VP-SA WRB 2. Carlisle® Fire Resist 705 RS, Fire Resist Barrithane VP, 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. Grace Perm-A-Barrier® NPL (aka PAB NP20), Perm-A-Barrier® VPL, Perm-A-Barrier® Aluminum Wall Membrane (AWM), Perm-A-Barrier® VPL LT, Perm-A-Barrier® VPS 6. Henry Air-Bloc 17MR, 21S, 31MR, 33MR and 16MR 7. Tyvek CommercialWrap 8. PolyGuard Air Lok Flex VP, FlexGuard, Air Lok Flex (only with claddings 1 - 6) (Table 5) 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 manufacturer 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 Fabric embedded in Fire-Resist Barritech VP/NP/NP LT or embedded in Fire Resist Barrithane VP

Continued . . .

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Table 7. NFPA 285 Allowable WRB Materials with R2+ SHEATHE[1,2,3,4,5,6,7,8]

Wall Component	Materials
	iii. 4" Foil-GRIP 1402 (with surface preparation as recommended by Henry, A Carlisle Company 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 Henry, A Carlisle Company 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 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 Henry, A Carlisle Company 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 Henry, A Carlisle Company 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 manufacturer 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 Fabric 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 Henry, A Carlisle Company 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 Henry, A Carlisle Company 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 Henry, A Carlisle Company 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 Henry, A Carlisle Company 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 5. In the NFPA 285 test, flashing for fenestration, including Through-Wall Flashing (TWF), are not considered part of the WRB. TWF is permitted for use in wall assemblies clad with masonry or stone at the base of wall, head of wall, relieving angle, window head, windowsill, and at other interruptions in the exterior cavity. TWF shall be applied a maximum of 8" onto the back-up wall and terminate at daylight or onto a drip edge. The following TWF products may be used: a. CCW TWF/XLT (with surface preparation as recommended by Henry, A Carlisle Company 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. Pre-Kleened EPDM TWF loose-laid or adhered with SURE-SEAL 90-8-30A bonding Adhesive or SURE-SEAL Low VOC Bonding Adhesive c. Metal TWF by others 6. BRT-801 tape may be used over Fire-Resist 705 RS at membrane splices, terminations, and penetrations. Fire-Resist 705 RS and the substrate may be treated with CCW-702, CCW-702 LV, CCW-702 WB, or Low VOC Travel-Tack to promote adhesion of BRT-801. 7. Fire-Resist 705 RS may be used in the following applications: a. Over the exterior insulation, while another approved WRB is used over the base wall assembly. b. Over a WRB on the base wall assembly while no exterior insulation is used. Use only WRBs listed below: i. CC Fire Resist 705 FR-A ii. Other WRBs that produce no ignition when tested per ASTM E1354 at a heat flux of 50 kW/m^2. 8. Insulating coating applied over noncombustible substrate can be used for mitigating thermal bridging at wall assembly terminations and penetrations. Coating applied in these conditions cover a small percentage of the total wall surface area. The following products are allowed: a. Aerolon 945 tape with primer by Tnemec b. Aerolon 971 coating with primer by Tnemec.

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6.6 Alternative techniques shall be permitted in accordance with accepted engineering practice and experience. These provisions for the use of alternative materials, designs, and methods of construction are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed herein. This includes, but is not limited to, the following areas of engineering: mechanics of materials, structures, building science, and fire science.

7 Certified Performance[35]

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.[36]

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.[37]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 R2+ SHEATHE complies 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 (UL 723) for flame spread and smoke development ratings in accordance with IBC Section 2603.3, IBC Section 2603.5.4, and IRC Section R303.3.[38]

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 and IRC Section R303.6,[39] per IRC Section R303.4.[40]

8.1.4 Performance regarding the potential heat generated by the FPIS in accordance with IBC Section 2603.5.3.

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

8.1.6 Performance with regard to ignition in compliance with IBC Section 2603.5.7.

8.1.7 Performance for use in exterior walls of buildings as a WRB in accordance with IBC Section 1403.2 and IRC Section R703.2.

8.1.8 Performance for use in exterior walls of buildings as continuous insulation (ci) in accordance with IECC Section C402.1.3.

8.1.9 Performance in exterior walls of buildings as vapor retarder in accordance with IBC Section 202, IBC Section 1404.3, IRC Section R202, and IRC Section R702.7.

8.1.10 Performance for use in exterior walls of buildings as an air barrier material in accordance with IRC Section N1101.10.5, IECC Section R303.1.5, and IECC Section C402.6.2.3.1.[41]

8.1.11 Wind pressure resistance and other structural requirements in accordance with IBC Chapter 16 is outside the scope of this evaluation.

8.2 Any building code, regulation and/or accepted engineering evaluations (e.g., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ, which is an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP or approved sources. DrJ is qualified[42] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[43] respectively.

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

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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, contact the manufacturer for counsel on the proper installation method.

9.3 *Installation Procedure*

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

9.3.1.1 Protect surrounding areas and surfaces from damage.

9.3.1.2 For installation of R2+ SHEATHE on exterior and over WRB on the base wall, ensure that WRB is installed correctly and is in good condition before covering with R2+ SHEATHE.

9.3.1.2.1 When used in an NFPA 285 approved assembly for exterior-use as detailed in **Table 5**, WRB must be one of those identified in **Table 7**.

9.3.1.3 For installation of R2+ SHEATHE on interior and over air/water-resistive barrier on the base wall, ensure that air/water-resistive barrier is one of those identified in **Table 7**, and the air/water-resistive barrier is installed correctly and is in good condition before covering with R2+ SHEATHE.

9.3.1.3.1 Air and water-resistive barriers used in NFPA 285 approved interior assemblies shall be as identified in **Table 7**.

9.3.1.4 R2+ SHEATHE shall not be applied over walls while they are vulnerable to water intrusion from above or behind.

9.3.1.5 Do not block flashing, weeps, or other drainage paths with R2+ SHEATHE.

9.3.1.6 Do not span expansion joints with R2+ SHEATHE.

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

9.3.1.8 Beginning at the base of the wall, apply horizontally using maximum board lengths to minimize the number of joints.

9.3.1.9 Offset R2+ SHEATHE board joints in neighboring rows a minimum of 6". Do not form four-corner intersections.

9.3.1.10 R2+ SHEATHE may be applied vertically, as required.

9.3.1.11 Pre-cut to fit openings and penetrations.

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

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

9.3.1.14 Mechanically fasten using the fastening pattern as indicated.

9.3.1.14.1 Space fasteners 12" (305 mm) o.c. at the perimeter and 16" (406 mm) o.c. in the field.

9.3.1.14.2 Set back perimeter fasteners $^{3}/_{8}$" (9.5 mm) from board edges.

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9.3.1.14.3 ***Note for Exterior Application:*** Where R2+ SHEATHE is 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+ SHEATHE attachment function shall be designed for this function. If the cladding attachment is 16" (406 mm) o.c. or closer, and it tightly secures the insulation, no additional fastening or adhesive is required.

9.3.1.14.4 ***Note for Interior Application:*** Where R2+ SHEATHE is installed by the same trade as the interior drywall, or in close cooperation with that trade, drywall attachment hardware can supplement or replace the insulation fasteners and insulation adhesive. Drywall fasteners fulfilling the R2+ SHEATHE attachment function shall be designed for this function. If the drywall attachment is 16" (406 mm) o.c. or closer, and it tightly secures the insulation, no additional fastening or adhesive is required.

9.3.1.15 When an approved adhesive is used, periodically verify adhesion. Properly installed adhesively applied R2+ SHEATHE will cohesively break the adhesive while still wet and destroy the substrate when dry.

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

9.3.1.15.2 When used in a NFPA 285 approved assembly, adhesives must be one of those that are listed in **Table 7**.

9.3.1.16 Fill gaps greater than 1/8" (3 mm) between insulation boards with expanding spray foam with approved sealant and strike flush. Expanding spray foam may also be applied onto the insulation board edges during installation.

9.3.1.17 Verify all materials are installed in accordance with current Henry published literature and local code requirements.

9.3.1.18 Additional information on the installation and detailing of R2+ SHEATHE can be found at www.henry.com/commercial/products/polyiso-insulation/wall-insulation/r2-silver2.

9.3.2 This section provides additional guidelines for the installation of R2+ SHEATHE as an air and water-resistive barrier:

9.3.2.1 When used in a NFPA 285 approved assembly as an air/water-resistive barrier, see **Section 6.3** and **Table 6**.

9.3.2.2 When used in a NFPA 285 approved assembly as a WRB, see **Section 6.4** and **Table 7**, including all notes.

9.3.2.3 Use minimum 1" (25.4 mm) thickness R2+ SHEATHE.

9.3.2.4 Install directly over wood or steel studs or over exterior sheathing fastened to wood or steel studs.

9.3.2.5 Fasten R2+ SHEATHE boards with corrosion-resistant screws or Heckmann™ Pos-I-Tie®, fitted with Rodenhouse Thermal-Grip® ci plastic washers. Space fasteners 16" (406 mm) o.c. in the field and 12" (305 mm) o.c. at the perimeter.

9.3.2.5.1 Other fastening used shall be installed 16" (406 mm) o.c. in the field and 12" (305 mm) o.c. at the perimeter. Other fastening shall be verified as air and water tight through ASTM E2357 and ASTM E331 testing or it shall be sealed with caulk or flashing tape.

9.3.2.6 Tape over board joints with 4" (102 mm) width Aluma-Grip 1402 tape by CCW.

9.3.2.7 Cover inside/outside corners with Aluma-Grip 701 by CCW. Aluma-Grip 701 shall bear 3" (76 mm) minimum onto each side of angle.

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9.3.2.8 Wrap window openings with Aluma-Grip 701. Aluma-Grip 701 shall wrap at least 3" (76 mm) onto wall and shall return far enough into the window opening to provide continuous air/water seal to window frame.

9.3.2.9 Flash pipe and duct penetrations through R2+ SHEATHE with Aluma-Grip 701.

9.3.2.10 Consult manufacturer details and instructions for complete information about installation of R2+ SHEATHE as an air and water-resistive barrier.

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 ratings testing in accordance with ASTM E84 (UL 723)

10.1.2 Fire performance criteria testing in accordance with NFPA 285

10.1.3 Fire performance criteria testing in accordance with NFPA 286

10.1.4 Potential heat testing in accordance with NFPA 259

10.1.5 Air barrier material testing in accordance with ASTM E2178

10.1.6 Air barrier assembly testing in accordance with ASTM E2357

10.1.7 Vapor impermeability testing in accordance with ASTM E96 Method A and Method B

10.1.8 Water-resistive barrier testing in accordance with ASTM E331

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 an RDP. 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*

10.5.1 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.[44]

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

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11 Findings

11.1 As outlined in **Section 6**, R2+ SHEATHE has performance characteristics that were tested and/or meet applicable regulations. In addition, they 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+ SHEATHE shall be approved for the following applications:

11.2.1 R2+ SHEATHE is approved for use in exterior walls of buildings of any height of Type I–IV construction in accordance with 2018 IBC Section 2603.5.

11.2.2 R2+ SHEATHE are approved for use in wall assemblies meeting the requirements of NFPA 285-12 testing when constructed in accordance with **Table 5** and **Table 6**.

11.2.3 Complies with, or is a suitable alternative to, the applicable sections of the codes listed in **Section 4**.

11.2.4 R2+ SHEATHE up to $3^1/_2$" (88.9 mm) thick is approved for use without a thermal barrier on walls only or ceilings only to NFPA 286, in accordance with IBC Section 2603.9 and IRC Section R303.6,[45] and meets the criteria of IBC Section 803.1.1. Therefore, R2+ SHEATHE may be left exposed and require no thermal barrier or ignition barrier protection.

11.2.5 R2+ SHEATHE up to $3^1/_2$" (88.9 mm) thick are approved for use without an ignition barrier on walls and/or ceilings in attics and crawl spaces to NFPA 286 in accordance with IBC Section 2603.9 and IRC Section R303.6,[46] and meets the criteria of IBC Section 803.1.1. Therefore, R2+ SHEATHE requires no ignition barrier protection in attics and crawl spaces.

11.2.6 Use in exterior walls of buildings as a WRB in accordance with IBC Section 1403.2 and IRC Section R703.2, when installed in accordance with the manufacturer installation instructions and this report.

11.2.7 Use in exterior walls of buildings as a vapor retarder in accordance with IBC Section 1404.3 and IRC Section R702.7.

11.2.8 Use in exterior walls of buildings as an air barrier in conformance with IECC Section C402.6.1[47] when installed in accordance with the manufacturer installation instructions and this report.

11.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Henry, A Carlisle Company.

11.4 IBC Section 104.2.3[48] (IRC Section R104.2.2[49] and IFC Section 104.2.3[50] are similar) in pertinent part state:

> 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 is not specifically prohibited by this code and has been approved.

11.5 **Approved:**[51] Building regulations require that the building official shall accept duly authenticated reports.[52]

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 Arrangement (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.[53]

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12 Conditions of Use

12.1 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.

12.2 As listed herein, R2+ SHEATHE shall not be used:

12.2.1 As a structural nailing base for claddings; nor

12.2.2 To resist wind or lateral loads.

12.2.2.1 Walls shall be braced by other materials in accordance with the applicable code. In addition, the exterior wall covering shall be capable of resisting the full design wind pressure.

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 When the insulation boards are used on the exterior side of exterior walls of buildings of Type I, II, III, or IV construction, wall assemblies shall be constructed as described in **Table 5**.

12.5 When the insulation boards are used on the interior side of exterior walls of buildings of Type I, II, III, or IV construction, wall assemblies shall be constructed as described in **Table 6**.

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 and IRC Section R303.7.[54]

12.7 R2+ SHEATHE is manufactured in Smithfield, Pennsylvania; Franklin Park, Illinois; or Puyallup, Washington, under a quality control program with quality control inspections in accordance with IBC Section 110.3.10[55] and IBC Section 110.3.11.[56]

12.8 The wall assemblies listed in **Table 5**, **Table 6**, and **Table 7** 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 At a minimum, this innovative product shall be installed per **Section 9**.

12.9.4 The review of this report by the AHJ shall comply with IBC Section 104.2.3.2 and IBC Section 105.3.1.

12.9.5 This innovative product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.7.2, IBC Section 110.4, IBC Section 1703, IRC Section R104.7.2, and IRC Section R109.2.

12.9.6 The application of this innovative product 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 make, or cause to be made, the necessary tests and investigations; or 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 Section 104.2.3"*, all of IBC Section 104, and IBC Section 105.3.

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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 R2+ SHEATHE, as listed in **Section 1.1**, is 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.henry.com/commercial/products/polyiso-insulation/wall-insulation/r2-silver2.

14 Review Schedule

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

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

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Notes

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

2 Capitalized terms and responsibilities are defined pursuant to the applicable building code, applicable reference standards, the latest edition of TPI 1, the NDS, AISI S202, US professional engineering law, Canadian building code, Canada professional engineering law, Qualtim External Appendix A: Definitions/Commentary, Qualtim External Appendix B: Project/Deliverables, Qualtim External Appendix C: Intellectual Property and Trade Secrets, definitions created within Design Drawings and/or definitions within Reference Sheets. Beyond this, terms not defined shall have ordinarily accepted meanings as the context implies. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

3 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1702

4 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/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3

5 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.2:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests

6 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/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.1:~:text=Conformance%20to%20Standards-,The%20design%20strengths%20and%20permissible%20stresses,-of%20any%20structural

7 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20make%2C%20or%20cause%20to%20be%20made%2C%20the%20necessary%20tests%20and%20investigations%3B%20or%20the%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%20104.2.3.

8 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4.2

9 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_agency

10 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_source

11 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.

12 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/

13 https://www.cbitest.com/accreditation/

14 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.1:~:text=directed%20to%20enforce%20the%20provisions%20of%20this%20code

15 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3 AND https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#105.3.1

16 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

17 https://iaf.nu/en/about-iaf-mla/#:~:text=Once%20an%20accreditation%20body%20is%20a%20signatory%20of%20the%20IAF%20MLA%2C%20it%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

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

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

20 Unless otherwise noted, the links referenced herein use un-amended versions of the 2024 International Code Council (ICC) 2024 International Code Council (ICC) model codes as foundation references. Mississippi versions of the IBC 2024 and the IRC 2024 are un-amended. This material, product, design, service and/or method of construction also complies with the 2000-2012 versions of the referenced codes and the standards referenced therein. As pertinent to this technical and code compliance evaluation, CBI and/or DrJ staff have reviewed any state or local regulatory amendments to assure this report is in compliance.

21 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by the local jurisdiction. https://up.codes/codes/general

22 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by state. https://up.codes/codes/general

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

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

25 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#listed AND https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#labeled

26 2021 IRC Section R316

27 2021 IBC Section 1404.3.2

28 2021 IECC Section C402.5.1.3 and 2018 IECC Section C402.5.1.2.1

29 2021 IECC Section C402.5.1.4 AND 2018 IECC Section C402.5.1.2.2

30 WRB is not required for detached accessory buildings.

31 2021 IBC Section 1404.16

32 2021 IBC Section 1404.16.1

33 2021 IBC Section 1404.16.2

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34 2021 IRC Section R316.5.7

35 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4

36 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

37 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

38 2021 IRC Section R316.3

39 2021 IRC Section R316.6

40 2021 IRC Section R316.4

41 2021 IECC Section C402.5.1.3 AND 2018 IECC Section C402.5.1.2.1

42 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.

43 https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?prgID=1&orgID=2125&statusID=4#:~:text=Bill%20Payment%20Date-,Accredited%20Scopes,-13%20ENVIRONMENT.%20HEALTH

44 See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

45 2021 IRC Section R316.6

46 2021 IRC Section R316.6

47 2021 IECC Section C402.5.1

48 2021 IBC Section 104.11

49 2021 IRC Section R104.11

50 2018: https://up.codes/viewer/wyoming/ifc-2018/chapter/1/scope-and-administration#104.9 AND 2021: https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11

51 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 (https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#201.4) where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

52 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

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

54 2021 IRC Section R316.7

55 2018 IBC Section 110.3.9

56 2018 IBC Section 110.3.10

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