



CERTIFICATION



Approved. Sealed. Code Compliant.

Technical Evaluation Report

TER 1407-01

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

**Carlisle® Coatings &
Waterproofing Incorporated
(CCW)**

Product:

R2+ Products

Issue Date:

July 8, 2014

Revision Date:

October 14, 2020

Subject to Renewal:

October 1, 2021



COMPANY
INFORMATION:

Carlisle® Coatings & Waterproofing Incorporated
(CCW)

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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 PRODUCTS EVALUATED¹

1.1 R2+ Products

1.1.1 R2+ SILVER

1.1.2 R2+ MATTE

1.1.3 R2+ BASE

2 APPLICABLE CODES AND STANDARDS^{2,3}

2.1 Codes

2.1.1 *IBC—12, 15, 18: International Building Code®*

2.1.2 *IECC—12, 15, 18: International Energy Conservation Code*

2.1.3 *IRC—12, 15, 18: International Residential Code®*

¹ Building codes require data from valid [research reports](#) be obtained from [approved sources](#). Agencies who are accredited through ISO/IEC 17065 have met the [code requirements](#) for approval by the [building official](#). DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – [Accreditation #1131](#).

Through ANAB accreditation and the [IAF MLA](#), DrJ certification can be used to obtain product approval in any [jurisdiction](#) or country that has [IAF MLA Members & Signatories](#) to meet the [Purpose of the MLA](#) – “certified once, accepted everywhere.”

Building official approval of a licensed [registered design professional](#) (RDP) is performed by verifying the RDP and/or their business entity complies with all professional engineering laws of the relevant [jurisdiction](#). Therefore, the work of licensed RDPs is accepted by [building officials](#), except when plan (i.e., peer) review finds an error with respect to a specific section of the code. Where this TER is not approved, the [building official](#) responds in writing stating the reasons for [disapproval](#).

For more information on any of these topics or our mission, product evaluation policies, product approval process, and engineering law, visit drjcertification.org or call us at 608-310-6748.

² Unless otherwise noted, all references in this TER are from the 2018 version of the codes and the standards referenced therein (e.g., ASCE 7, NDS®, ASTM). This material, design, or method of construction also complies with the 2000-2015 versions of the referenced codes and the standards referenced therein.

³ All terms defined in the applicable building codes are italicized.



2.2 Standards and Referenced Documents

- 2.2.1 *ASTM C1289: Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*
- 2.2.2 *ASTM E119: Standard Test Methods for Fire Tests of Building Construction and Materials*
- 2.2.3 *ASTM E1354: Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*
- 2.2.4 *ASTM E136: Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C*
- 2.2.5 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*
- 2.2.6 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*
- 2.2.7 *FM 4880: Approval Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials*
- 2.2.8 *NFPA 259: Standard Test Method for Potential Heat of Building Materials*
- 2.2.9 *NFPA 268: Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source*
- 2.2.10 *NFPA 285: Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*
- 2.2.11 *NFPA 286: Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*
- 2.2.12 *UL 1040: Fire Test of Insulated Wall Construction*
- 2.2.13 *UL 1715: Fire Test of Interior Finish Material*
- 2.2.14 *UL 723: Test for Surface Burning Characteristics of Building Materials*

3 PERFORMANCE EVALUATION

- 3.1 R2+ SILVER, R2+ MATTE, and R2+ BASE were evaluated to determine:
 - 3.1.1 Performance for use in exterior walls of buildings of any height and of Type I-IV construction in accordance with [IBC Section 2603.5](#)
 - 3.1.2 Performance in accordance with *UL 723* for flame spread and smoke-developed index ratings in accordance with [IBC Section 2603.5.4](#)
 - 3.1.3 Performance for use without a thermal barrier in accordance with [IBC Section 2603.5.2](#)
 - 3.1.4 Performance with regard to the potential heat generated by the foam plastic insulating sheathing (FPIS) in accordance with [IBC Section 2603.5.3](#)
 - 3.1.5 Performance with regard to vertical and lateral fire propagation in accordance with [IBC Section 2603.5.5](#)
 - 3.1.6 Performance with regard to ignition in accordance with [IBC Section 2603.5.7](#)
- 3.2 Wind pressure resistance in accordance with [IBC Section 2603.10](#) and [IRC Section R316.8](#) is outside the scope of this evaluation.
- 3.3 Fire resistance rated wall assemblies in accordance with [IBC Section 2603.5.1](#) are outside the scope of this evaluation.
- 3.4 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.
- 3.5 Any engineering evaluation conducted for this TER was performed on the dates provided in this TER and within Dr.J's professional scope of work.

4 PRODUCT DESCRIPTION AND MATERIALS

4.1 R2+ SILVER, R2+ MATTE, and R2+ BASE (Figure 1) are proprietary FPIS products.

4.1.1 R2+ SILVER is a polyisocyanurate insulation board adhered to foil facers.

4.1.2 R2+ MATTE is a polyisocyanurate insulation board adhered to coated glass facers.

4.1.3 R2+ BASE is a polyisocyanurate insulation board bonded to APA-TECO rated exposure fire treated plywood.



FIGURE 1. R2+ SILVER, R2+ MATTE, & R2+ BASE

4.2 The foam core of R2+ SILVER, R2+ MATTE, and R2+ BASE is manufactured in accordance with ASTM C1289.

4.3 Material Availability

4.3.1 Thickness:

4.3.1.1 R2+ SILVER and R2+ MATTE: 1" (25 mm) through 3.5" (89 mm)

4.3.1.2 R2+ BASE: available with either a $\frac{5}{8}$ " or $\frac{3}{4}$ " fire treated plywood and 1" through 3.5" coated glass polyiso

4.3.1.2.1 Total thickness with $\frac{5}{8}$ " substrate: 1.6" through 4.1"

4.3.1.2.2 Total thickness with $\frac{3}{4}$ " substrate: 1.7" through 4.3"

4.3.2 Standard product width: 48" (1220 mm)

4.3.3 Standard Lengths:

4.3.3.1 R2+ SILVER and R2+ MATTE: 96" (2438 mm), 120" (3048 mm) and 144" (3657 mm)

4.3.3.2 R2+ MATTE and R2+ BASE: 96" (2438 mm)

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

5 APPLICATIONS

5.1 General

5.1.1 R2+ SILVER, R2+ MATTE, and R2+ BASE are FPIS complying with IBC Section 2603.

5.1.2 R2+ SILVER, R2+ MATTE, and R2+ BASE are used in exterior walls of buildings of any height and of Type I-IV construction in accordance with IBC Section 2603.5.

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

5.1.4 Environmental Product Declarations (EPD) for R2+ SILVER, R2+ MATTE, and R2+ BASE are available at polyiso.org.

5.2 Fire Safety Performance

5.2.1 Surface Burn Characteristics:



5.2.1.1 R2+ SILVER, R2+ MATTE, and R2+ BASE were evaluated to assess performance with regard to flame spread and smoke-developed index in accordance with *ASTM E84* as shown in Table 1.

TABLE 1. FIRE PERFORMANCE OF R2+ SILVER, R2+ MATTE, & R2+ BASE¹

Product Name	Flame Spread Index	Smoke-Developed Index
R2+ SILVER, R2+ MATTE, & R2+ BASE	≤ 75	≤ 450
1. Foam core tested in accordance with <i>ASTM E84</i> . Flame spread and smoke-developed indexes are shown for comparison purposes only and are not intended to represent the performance under actual fire conditions.		

5.2.2 Ignition:

5.2.2.1 R2+ SILVER, R2+ MATTE, and R2+ BASE were evaluated to assess performance with regard to ignition (*NFPA 268*) in accordance with *IBC Section 2603.5.7*. R2+ SILVER, R2+ MATTE, and R2+ BASE comply with this section when the exterior side of the sheathing is protected with one of the following materials:

- 5.2.2.1.1 A thermal barrier complying with *IBC Section 2603.4*
- 5.2.2.1.2 A minimum 1" (25 mm) thickness of concrete or masonry
- 5.2.2.1.3 Glass-fiber-reinforced concrete panels of a minimum thickness of 3/8" (9.5 mm)
- 5.2.2.1.4 Metal-faced panels having minimum 0.019"-thick (0.48 mm) aluminum or 0.016"-thick (0.41 mm) corrosion-resistant steel outer facings
- 5.2.2.1.5 A minimum 7/8" (22.2 mm) thickness of stucco complying with *IBC Section 2510*

5.2.3 Potential Heat:

5.2.3.1 R2+ SILVER, R2+ MATTE, and R2+ BASE 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+ SILVER, R2+ MATTE, & R2+ BASE

Product	Potential Heat ¹ (Btu/lb)
R2+ SILVER	11,503
R2+ MATTE	11,503
R2+ BASE	11,503
SI: 1 lb = 4.45 N 1. Tested in accordance with <i>NFPA 259</i> .	

5.2.4 Vertical and Lateral Fire Propagation:

- 5.2.4.1 R2+ SILVER, R2+ MATTE, and R2+ BASE were tested to assess their performance with regard to vertical and lateral fire propagation in accordance with *NFPA 285* and *IBC Section 2603.5.5*.
- 5.2.4.2 Engineering analysis has also been conducted to assess substitution of other products within the approved wall assemblies.
- 5.2.4.3 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 FSI material as required in *IBC Section 2603.5.4*.



TABLE 3. APPROVED NFPA 285 WALL ASSEMBLIES USING R2+ MATTE AS EXTERIOR INSULATION¹

Wall Component	Materials
Base Wall System Use either 1, 2, 3 or 4	<ol style="list-style-type: none"> 1. Cast concrete walls 2. CMU concrete walls 3. 25-gauge min. 3⁵/₈" (min.) steel studs spaced 24" o.c. (max.) <ol style="list-style-type: none"> 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.) <ol style="list-style-type: none"> a. 5/8" Type X gypsum wallboard interior b. Bracing as required by building code
Fire-Stopping at Floor Lines	<ol style="list-style-type: none"> 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 or 11 Items 8, 9, 10 and 11 may only be used with exterior sheathing 2.	<ol style="list-style-type: none"> 1. None 2. 1½" min. Covestro EcoBay CC SPF (up to full cavity thickness) 3. 1½" min. BASF Walltite SPF (up to full cavity thickness) 4. Any noncombustible insulation per <i>ASTM E136</i> 5. Any mineral fiber (Board type Class A <i>ASTM E84</i> faced or unfaced) 6. Any fiberglass (Batt type Class A <i>ASTM E84</i> faced or unfaced) 7. Any foam plastic insulation (SPF or board type) that has been tested per <i>ASTM E1354</i> (at a minimum of 20 kW/m² 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 ½ inches (only with ½ in. [min.] exterior gypsum sheathing) 10. SWD Urethane Quik-Shield 112 up to 6 inches in s inch (max.) stud cavities with an air gap not exceeding 2½ inches. 11. 1½" (min.) ThermoSeal 2000 (up to full cavity thickness).
Exterior Sheathing Use either 1, 2 or 3	<ol style="list-style-type: none"> 1. None (only with claddings 1-6 and cavity insulation 1, 2, 4, 5 or 6) 2. ½" or thicker exterior gypsum sheathing 3. ½" (min.) FRTW structural panels in Type III construction
WRB Over Base Wall Surface	See Table 6
Exterior Insulation Use option 1	<ol style="list-style-type: none"> 1. 3½" (max.) R2+ MATTE
WRB Over Exterior Insulation	See Table 6



Wall Component	Materials
<p>Exterior Cladding Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 17</p> <p>Item 7 may use any tested/approved installation technique.</p> <p>Items 8, 9 or 12 may use any standard installation technique.</p>	<ol style="list-style-type: none"> 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/external 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 <i>NFPA 285</i>. 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 <i>NFPA 285</i> criteria. 11. Autoclaved-aerated-concrete (AAC) panels that have successfully passed <i>NFPA 285</i> 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 <i>NFPA 285</i> or stays in place when tested per <i>ASTM E119</i> (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 <i>ASTM E119</i> (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an <i>NFPA 285</i> 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.
<p>SI: 1 in = 25.4 mm</p> <ol style="list-style-type: none"> 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 <i>ASTM E1354</i> 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 INSULATION¹

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.) <ul style="list-style-type: none"> 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.) <ul style="list-style-type: none"> 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 or 11. Items 8, 9, 10 and 11 may only be used with exterior sheathing 2.	1. None 2. 1½" min. Covestro EcoBay CC SPF (up to full cavity thickness) 3. 1½" min. BASF Walltite SPF (up to full cavity thickness) 4. Any noncombustible insulation per <i>ASTM E136</i> 5. Any mineral fiber (Board type Class A <i>ASTM E84</i> faced or unfaced) 6. Any fiberglass (Batt type Class A <i>ASTM E84</i> faced or unfaced) 7. Any foam plastic insulation (SPF or board type) that has been tested per <i>ASTM E1354</i> (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 ½ inches (only with ½ in. [min.] exterior gypsum sheathing) 10. SWD Urethane Quik-Shield 112 up to 6 inches in s inch (max.) stud cavities with an air gap not exceeding 2½ inches. 11. 1½" (min.) ThermoSeal 2000 (up to full cavity thickness).
Exterior Sheathing Use either 1, 2 or 3	1. None (only with cavity insulation 1, 4, 5 or 6) 2. ½" or thicker exterior gypsum sheathing 3. ½" (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. 3½" (max.) R2+ SILVER
WRB Over Exterior Insulation	See Table 6 R2+ SILVER may be used with or without Cavclear drainage mat (Cavclear insulation system)
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/external 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 1½" thick using any standard non-open joint installation technique such as shiplap. 6. Terra Cotta Cladding – Minimum 1¼" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap.



Wall Component	Materials
<p>SI: 1 in = 25.4 mm</p> <ol style="list-style-type: none">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 <i>ASTM E1354</i> 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 Insulation¹

Wall Component	Materials
Base Wall System Use either 1, 2, 3 or 4	<ol style="list-style-type: none"> 1. Cast concrete walls 2. CMU concrete walls 3. 25-gauge min. 3⁵/₈" (min.) steel studs spaced 24" o.c. (max.) <ol style="list-style-type: none"> a. 5⁵/₈" 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.) <ol style="list-style-type: none"> a. 5⁵/₈" Type X gypsum wallboard interior b. Bracing as required by code
Fire-Stopping at Floor Lines	<ol style="list-style-type: none"> 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 or 11 Items 3, 8, 9, 10 and 11 may only be used with exterior sheathing 2.	<ol style="list-style-type: none"> 1. None 2. 1½" min. Covestro EcoBay CC SPF (up to full cavity thickness) 3. 1½" min. BASF Walltite SPF (up to full cavity thickness) 4. Any noncombustible insulation per <i>ASTM E136</i> 5. Any mineral fiber (Board type Class A <i>ASTM E84</i> faced or unfaced) 6. Any fiberglass (Batt type Class A <i>ASTM E84</i> faced or unfaced) 7. Any foam plastic insulation (SPF or board type) that has been tested per <i>ASTM E1354</i> (at a minimum of 20 kW/m² 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 ½ inches (only with ½ 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 2½" 11. 1½" (min.) Thermoseal 2000 (up to full cavity thickness)
Exterior Sheathing Use either 1, 2 or 3	<ol style="list-style-type: none"> 1. None (only with cavity insulation 1, 2, 4, 5 or 6) 2. ½" or thicker exterior gypsum sheathing 3. ½" (min.) FRTW structural panels in Type III construction
WRB Over Base Wall Surface	See Table 6
Exterior Insulation Use option 1	<ol style="list-style-type: none"> 1. 4¼" (max.) R2+ BASE (3½" foam max., ¾" FR Plywood max.)
WRB Over Exterior Insulation	See Table 6



Wall Component	Materials
<p>Exterior Cladding Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 17</p> <p>Item 9 may use any tested/approved installation technique.</p> <p>Items 10, 11 or 14 may use any standard installation technique.</p>	<ol style="list-style-type: none"> 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/external 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 <i>ASTM E119</i> (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an <i>NFPA 285</i> 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 <i>NFPA 285</i>. 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 <i>NFPA 285</i> criteria. 13. Autoclaved-aerated-concrete (AAC) panels that have successfully passed <i>NFPA 285</i> 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 <i>NFPA 285</i> or stays in place when tested per <i>ASTM E119</i> (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
<p>SI: 1 in = 25.4 mm</p> <ol style="list-style-type: none"> 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 <i>ASTM E1354</i> 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

Wall Component	Materials
<p>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 or 26.</p> <p>Note: Some WRBs are only allowed with specific systems.</p> <p>Item 24 (Securock® Exoair® 430) or 25 (DensElement w/ FastFlash) replaces the exterior sheathings in Tables 5-8. 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.</p>	<ol style="list-style-type: none"> 1. None 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. CCW-705 with 702 LV, 702 WB, Cav-Grip, Low VOC Travel-Tack, or 702 adhesives may be used with R2+ SILVER, MATTE or BASE and cladding options 1-8. 4. GE Momentive SEC 2500 SilShield 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 7. StoGuard Vaporseal 8. 3M 3015 (with Hold Fast 70 adhesive @ 6 mils) 9. Henry Air-Bloc 21S, AB 33, AB 31 or AB 17. AB 32MR may be used only with R2+ SILVER, MATTE or BASE 10. Tyvek CommercialWrap or CommercialWrap D. Fluid Applied WB may be used only with R2+ SILVER, MATTE or BASE 11. PolyGuard Air Lok Flex VP or FlexGuard. Air Lok Flex may be used only with claddings 1-6 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/m² 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+ SILVER, MATTE or BASE) 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 Tables 5-8. 25. 5/8" Georgia Pacific DenElement, flashed with Prosoco R-Guard FastFlash on sheathing joints. 26. Dow Corning Dowsil DefendAir200



Wall Component	Materials
<p>WRB Over Exterior Insulation Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 or 20</p> <p>Note: Some WRB's are only allowed with specific systems</p> <p>Insulation Joints may be taped with Foil-Grip 1402, 4" width (max.)</p>	<ol style="list-style-type: none"> 1. None 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/m² 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

SI: 1 in = 25.4 mm

1. CCW LM 800 XL adhesive applied discontinuously at a rate of 3/8" x 3" dabs, 16" o.c. may be used to adhere exterior insulation to WRB over sheathing, concrete or CMU for those applications requiring this adhesive to be used.
2. The following may be used as gap filler between insulation panels: FOMO HandiFoam FireBlock and TVM FireBlock.
3. CAV-Grip™ or Low VOC Travel Tack may be used as an adhesive (application rate as per mfg. instructions) to attach exterior insulation panels to the WRB surface.
4. The following can be used with Fire Resist Barritech NP/VP (of VP LT) for detailing window openings, inside/outside corners, transitions, terminations and penetrations:
 - a. Aluma-GRIP 701 or Fire Resist 705 FR-A with any of these contact adhesives as surface prep: CCW-702, CCW-702 LV, CCW-702 WB, CAV-Grip, Low VOC Travel Tack.
 - b. CCW LiquiFiber-W imbedded in Fire Resist Barritech NP/VP (or VP LT)
 - c. CCW DCH Reinforcing Fabric imbedded in Fire Resist Barritech NP/VP
5. The following may be used for detailing maximum 1/4" width exterior gypsum sheathing joints on the base wall assembly with the Fire Resist Barritech NP/VP (or VP LT) membrane:
 - a. CCW LM 800 XL or other approved (less flammable than LM 800 XL) polyurethane or latex sealant. Sealant fills sheathing joint, and has a maximum 1" width x 3/8" thickness profile over sheathing joint. Caulking shall be covered with 40 mil dry thickness of Fire Resist Barritech NP/VP (or VP LT).
 - b. 4" width maximum CCW DCH Reinforcing Fabric centered over joint and imbedded in Fire Resist Barritech NP/VP (or VP LT).
 - c. Maximum 4" wide, self-adhered flashing tap centered over joint. Gypsum sheathing surface may be prepared with any of these contact adhesives to improve bond of the flashing tape: CCW-702, CCW-702 LV, CCW-702 WB, CAV-Grip, Low VOC Travel Tack. Flashing tape shall be covered with 40 mil dry thickness of Fire Resist Barritech NP/VP (or VP LT). The following flashings tapes are allowed:
 - i. Alum-GRIP-701
 - ii. Fire Resist 705 FR-A
 - iii. Foil-GRIP 1402
 - iv. Barritape
6. CCW BarriBond may be used in the following applications:
 - i. As a detail sealant with all CCW membranes (small discontinuous quantities - 1" width x 40 mil ribbon)
 - ii. As a liquid flashing (wrapping rough opening and corners) in Barritech VP and Barritech NP systems (40 mil thickness, 3" onto wall, all the way into rough opening, 40 mil thick 3" onto each side of corners)
 - iii. As a liquid flashing (wrapping rough opening) in 705 VP systems (40 mil thickness, 3" onto wall, all the way into rough opening)
 - iv. As an insulation adhesive (alternative to LM 800 XL) for attaching R2+ SILVER, R2+ MATTE and R2+ SHEATHE

5.2.5 Special Approval – 2012 IBC (or earlier):



5.2.5.1 R2+ SILVER, R2+ MATTE, and R2+ BASE 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 5.2.5 and the evaluations listed in Section 7.

5.2.5.2 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.

5.2.5.2.1 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.

5.2.5.2.2 Since R2+ SILVER, R2+ MATTE, and R2+ BASE are not intended for use as interior finishes, these are not appropriate end use tests.

5.2.5.2.3 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.

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

5.2.5.2.5 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 IBC Section 2603.5.2 for thermal barriers.

5.2.5.2.6 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.

5.2.5.2.7 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 IBC Section 2603.5.4 that requires a flame spread rating of 25 or less.

5.2.5.2.8 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.

5.2.6 Special Approval – 2015 IBC:

5.2.6.1 R2+SILVER, R2+ MATTE, and R2+ BASE 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 5.2.5 and the evaluations listed in Section 7.

5.2.6.2 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.

5.2.6.2.1 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.



- 5.2.6.2.2 Since R2+ SILVER, R2+ MATTE, and R2+ BASE are not intended for use as interior finishes, these are not the appropriate end-use tests for these applications.
- 5.2.6.2.3 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.
- 5.2.6.2.4 This special approval exempts a product from the need to comply with *IBC Section 2603.4* and *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.
- 5.2.6.2.5 R2+ SILVER, R2+ MATTE, and R2+ BASE 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.
- 5.2.6.2.6 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.
- 5.2.6.2.7 The foam plastic materials in R2+ MATTE, SILVER, R2+ MATTE, and R2+ BASE 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.
- 5.2.6.2.8 Based upon the above analysis and interpretation, R2+ SILVER, R2+ MATTE, and R2+ BASE meet the requirements of *IBC Section 2603.9* when installed in accordance with the provisions of this TER.

5.2.7 *Special Approval - 2018 IBC:*

- 5.2.7.1 R2+SILVER, R2+ MATTE, and R2+ BASE 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 5.2.5 and the evaluations listed in Section 7.
- 5.2.7.2 Special approval by large-scale testing is allowed by *2018 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.

- 5.2.7.2.1 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.
- 5.2.7.2.2 Since R2+ SILVER, R2+ MATTE, and R2+ BASE are not intended for use as interior finishes, these are not the appropriate end-use tests for these applications.
- 5.2.7.2.3 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.
- 5.2.7.2.4 This special approval exempts a product from the need to comply with *IBC Section 2603.4* and *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.
- 5.2.7.2.5 R2+ SILVER, R2+ MATTE, and R2+ BASE 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.



- 5.2.7.2.6 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.
- 5.2.7.2.7 The foam plastic materials in R2+ MATTE, SILVER, R2+ MATTE, and R2+ BASE 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.
- 5.2.7.2.8 Based upon the above analysis and interpretation, R2+ SILVER, R2+ MATTE, and R2+ BASE meet the requirements of IBC Section 2603.9 when installed in accordance with the provisions of this TER.



5.3 Air Barrier

- 5.3.1.1 R2+ MATTE may be used as an air barrier material as prescribed in IRC Section N1102.4.1.1, and IECC Section R402.4.1.1 and C402.5.1 in accordance with ASTM E2178.
- 5.3.1.2 Air permeability test results can be seen in Table 7.

TABLE 7. AIR PERMEABILITY

Product Name	Air Pressure	Air Permeability
R2+ MATTE	75 Pa	< 0.02 L/s*m ²
SI: 1 psi = 0.00689 MPa 1. Foam core tested in accordance with <u>ASTM E2178</u> . Air pressure and permeability numbers shown represent R2+ MATTE compliance and are not intended to represent the performance under actual conditions.		

6 INSTALLATION

6.1 Installation shall comply with the manufacturer’s installation instructions and this TER. In the event of a conflict between the manufacturer’s installation instructions and this TER, the more restrictive shall govern.

6.2 Installation Procedure

- 6.2.1 This section provides general guidelines for the installation of R2+ SILVER, R2+ MATTE, and R2+ BASE only. Refer to the manufacturer’s installation instructions, in addition to this TER, for complete details and requirements.
 - 6.2.1.1 Protect surrounding areas and surfaces from damage.
 - 6.2.1.2 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.
 - 6.2.1.3 FPIS shall not be applied over walls while they are vulnerable to water intrusion from above or behind.
 - 6.2.1.4 Do not block flashing, weeps or other drainage paths with FPIS.
 - 6.2.1.5 Do not span expansion joints with FPIS.
 - 6.2.1.6 During installation, take precautions to minimize moisture intrusion behind insulation.
 - 6.2.1.7 Beginning at the base of the wall, apply FPIS horizontally or vertically using maximum board lengths to minimize number of joints.
 - 6.2.1.8 Pre-cut FPIS to fit openings and penetrations.
 - 6.2.1.9 Offset FPIS board joints a minimum of 6". Do not form 4-corner intersections.
 - 6.2.1.10 Form a “corner lock” pattern by staggering vertical joints at inside and outside corners.
 - 6.2.1.11 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.
 - 6.2.1.12 Verify all materials are installed in accordance with current Carlisle® published literature and local code requirements.
 - 6.2.1.13 Additional information on the installation and detailing of R2+ SILVER, R2+ MATTE, and R2+ BASE can be found at carlisleccw.com.
- 6.2.2 This section provides additional general guidelines for the installation of R2+ SILVER and R2+ MATTE only. Refer to the manufacturer’s installation instructions, in addition to this TER, for complete details and requirements.
 - 6.2.2.1 Cut with a knife using a square to guide the cut or use a table saw.
 - 6.2.2.2 Abut all joints tightly and ensure an overall flush, level surface.
 - 6.2.2.3 Mechanically fasten using the fastening pattern as indicated.



- 6.2.2.4 Space fasteners 12" o.c. at the perimeter and 16" o.c. in the field.
- 6.2.2.5 Set back perimeter fasteners 3/8" from board edges.
- 6.2.2.6 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.
- 6.2.3 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.
- 6.2.4 Consult the detailed [manufacturer's installation instructions](#) for the proper adhesive pattern to maintain the drainage plane
- 6.2.5 This section provides additional general guidelines for the installation of R2+ BASE only. Refer to the [manufacturer's installation instructions](#), in addition to this TER, for complete details and requirements.
 - 6.2.5.1 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.
 - 6.2.5.2 Begin at base of wall from a firm, permanent support.
 - 6.2.5.3 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.
 - 6.2.5.4 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.
 - 6.2.5.5 Apply WRB, from approved list in Table 6, over plywood side of R2+ BASE according to WRB manufacturer's instructions.

7 TEST ENGINEERING SUBSTANTIATING DATA

- 7.1 Test reports and data supporting the following material properties and wall assembly performance:
 - 7.1.1 Flame spread and smoke developed ratings in accordance with *ASTM E84* by Factory Mutual
 - 7.1.2 Fire performance criteria in accordance with *NFPA 285* by Intertek and Architectural Testing
 - 7.1.3 Potential heat in accordance with *NFPA 259* by Intertek
 - 7.1.4 Air permeance in accordance with *ASTM E2178* by Intertek
- 7.2 Engineering analysis comparing the fire resistance properties of R2+ SILVER, R2+ MATTE, and R2+ BASE by Priest and Associates
- 7.3 Engineering analysis assessing the substitution of products within the approved *NFPA 285* tested wall assemblies by Priest and Associates
- 7.4 Some information contained herein is the result of testing and/or data analysis by other sources which conform to [IBC Section 1703](#) and relevant [professional engineering law](#). DrJ relies on accurate data from these sources to perform engineering analysis. DrJ has reviewed and found the data provided by other professional sources to be credible.
- 7.5 Where appropriate, DrJ's analysis is based on design values that have been codified into law through codes and standards (e.g., *IBC*, *IRC*, *NDS®*, and *SDPWS*). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g., lumber, steel, and concrete), DrJ relies upon the grade mark, stamp, and/or design values provided by raw material suppliers to be accurate and conforming to the mechanical properties defined in the relevant material standard.



8 FINDINGS

- 8.1 When used and installed in accordance with this TER and the manufacturer's installation instructions, the product(s) listed in Section 1.1 are approved for the following:
- 8.1.1 R2+ SILVER, R2+ MATTE, and R2+ BASE are approved for use in exterior walls of buildings of Type I-IV construction in accordance with IBC Section 2603.5
 - 8.1.2 R2+ SILVER, R2+ MATTE, and R2+ BASE 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
 - 8.1.3 R2+ SILVER, R2+ MATTE, and R2+ BASE described in this TER comply with, or are a suitable alternative to, the applicable sections of the codes listed in Section 2
- 8.2 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.9 are similar) 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, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in 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*.
- 8.3 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this TER, they are listed here.
- 8.3.1 No known variations

9 CONDITIONS OF USE

- 9.1 R2+ SILVER, R2+ MATTE, and R2+ BASE are subject to the following conditions:
- 9.1.1 This TER and the installation instructions, when required by a code official, shall be submitted at the time of permit application.
 - 9.1.2 R2+ SILVER, R2+ MATTE, and R2+ BASE 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.
 - 9.1.3 R2+ BASE may be used as a structural nailing base for claddings.
 - 9.1.4 R2+ SILVER, R2+ MATTE, and R2+ BASE shall not be used to resist lateral loads. Walls shall be braced by other materials in accordance with the applicable code, and the exterior wall covering shall be capable of resisting the full design wind pressure.
 - 9.1.5 When installed in areas where the probability of termite infestation is "very heavy" the installation must meet the requirements of IBC Section 2603.9.
 - 9.1.6 R2+ SILVER, R2+ MATTE, and R2+ BASE 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 110.3.9⁴ and 110.3.10⁵.
 - 9.1.7 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 2. 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 TER.

⁴ 2015 IBC Section 110.3.8

⁵ 2015 IBC Section 110.3.9



- 9.2 Where required by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.
- 9.3 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.4 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the Building Designer (e.g., owner or registered design professional).
- 9.5 At a minimum, this product shall be installed per Section 6 of this TER.
- 9.6 This product is manufactured under a third-party quality control program in accordance with IBC Section 104.4 and 110.4 and IRC Section R104.4 and R109.2.
- 9.7 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the owner or the owner's authorized agent. Therefore, the TER shall be reviewed for code compliance by the building official for acceptance.
- 9.8 The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer's instructions, the building official's inspection, and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.

10 IDENTIFICATION

- 10.1 The product(s) listed in Section 1.1 are identified by a label on the board or packaging material bearing the manufacturer's name, product name, TER number, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at carlisleccw.com.

11 REVIEW SCHEDULE

- 11.1 This TER is subject to periodic review and revision. For the most recent version of this TER, visit drjcertification.org.
- 11.2 For information on the current status of this TER, contact DrJ Certification.