DrJ CERTIFICATION

ANSI ACCREDITED
#1131
ISO/IEC 17065
Product Certification Body

Cultured Stone® & ProStone®
Applications Over Continuous Insulation

TER No. 1302-01

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DIVISION: 04 00 00 – MASONRY
Section: 04 70 00 – Manufactured Masonry
Section: 04 73 00 – Manufactured Stone Masonry

LEGACY

1. Products Evaluated:

1.1. Cultured Stone®

1.2. ProStone®

1.3. For the most recent version of this Technical Evaluation Report (TER), visit drjengineering.org. For more detailed state professional engineering and code compliance legal requirements and references, visit drjengineering.org/statelaw. DrJ is fully compliant with all state professional engineering and code compliance laws.

1.4. This TER can be used to obtain product approval in any country that is an IAF MLA Signatory (all countries found here) and covered by an IAF MLA Evaluation per the Purpose of the MLA (as an example, see letter to ANSI from the Standards Council of Canada). Manufacturers can go to jurisdictions in the U.S., Canada and other IAF MLA Signatory Countries and have their products readily approved by authorities having jurisdiction using DrJ's ANSI accreditation.

1.5. Building code regulations require that evaluation reports are provided by an approved agency meeting specific requirements, such as those found in *IBC* Section 1703. Any agency accredited in accordance with ANSI ISO/IEC 17065 meets this requirement within ANSI's scope of accreditation. For a list of accredited agencies, visit ANSI's website. For more information, see drjcertification.org.

DrJ is a Professional Engineering Approved Source

Learn more about DrJ's Accreditation

- DrJ is an ISO/IEC 17065 accredited product certification body through ANSI Accreditation Services.
- DrJ provides certified evaluations that are signed and sealed by a P.E.
- DrJ's work is backed up by professional liability insurance.
- DrJ is fully compliant with *IBC* Section 1703.

1.6. Requiring an evaluation report from a specific private company (i.e. ICC-ES, IAPMO, CCMC, DrJ, etc.) can be viewed as discriminatory and is a violation of international, federal, state, provincial and local anti-trust and free trade regulations.

1.7. DrJ's code compliance work:

1.7.1. Conforms to code language adopted into law by individual states and any relevant consensus based standard such as an ANSI or ASTM standard.

1.7.2. Complies with accepted engineering practice, all professional engineering laws and by providing an engineer's seal DrJ takes professional responsibility for its specified scope of work.

2. Applicable Codes and Standards:[1]

2.1. *2012*, *2015* and *2018 International Building Code* (*IBC*)

2.2. *2012*, *2015* and *2018 International Residential Code* (*IRC*)

2.3. *AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Members* (*AISI S100*)

2.4. *AISI S200 – North American Standard for Cold-Formed Steel Framing*

2.5. *ASCE/SEI 7 – Minimum Design Loads for Buildings and Other Structures (ASCE 7)*

2.6. *ASTM C90 – Standard Specification for Loadbearing Concrete Masonry Units*

2.7. *ASTM C482 – Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement Paste*

2.8. *ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*

2.9. *ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*

2.10. *ASTM D5206 – Standard Test Method for Windload Resistance of Rigid Plastic Siding*

2.11. *ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

2.12. *ASTM F1667 – Standard Specification for Driven Fasteners: Nails, Spikes, and Staples*

2.13. *AWC NDS – National Design Specification for Wood Construction* (*NDS*)

2.14. *AWC SDPWS – Special Design Provisions for Wind and Seismic (SDPWS)*

2.15. *DOC PS 1 – Structural Plywood* (*PS-1*)

2.16. *DOC PS 2 – Performance Standard for Wood-Based Structural-Use Panels* (*PS-2*)

2.17. *SBCA FS-100 – Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies* (*FS100*)

3. Performance Evaluation:

3.1. The Cultured Stone® and ProStone® products were evaluated for:

3.1.1. Use as an exterior wall covering in new or existing wood-framed and light gage steel-framed walls in accordance with *IBC* Section 1405.10[2] and *IRC* Section R703.12[3].

3.1.2. Use as an exterior wall covering over wood structural panels (WSP) with the addition of continuous insulation installed between the WSP and the Cultured Stone® and ProStone® products[4].

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[1] Unless otherwise noted, all references in this code compliant technical evaluation report (TER) are from the 2018 version of the codes and the standards referenced therein, including, but not limited to, *ASCE 7*, *SDPWS* and *WFCM*. This product also complies with the 2000-2015 versions of the *IBC* and *IRC* and the standards referenced therein. As required by law, where this TER is not approved, the building official shall respond in writing, stating the reasons this TER was not approved. For variations in state and local codes, if any see Section 8.

[2] *2009 IBC* Section 1404.4

[3] *2009 IRC* Section R703.7

[4] In lieu of WSPs, 5/8" gypsum wall board (GWB) or DensGlass is permitted

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3.1.3. Use as an exterior finish over concrete or masonry walls with the addition of continuous insulation installed between the concrete or masonry walls and the Cultured Stone® and ProStone® products.

3.1.4. Use as a weather-resistant covering in accordance with *IBC* Section 1403.2 and *IRC* Section R703.1.1.

3.1.5. The ability of the product to resist wind loads in accordance with *IBC* Section 1609 and *IRC* Section R703.1.2.

3.1.6. The ability of various fasteners to support the gravity and transverse loads induced by the products when installed over concrete and masonry construction with the addition of continuous insulation installed between the concrete and masonry and the Cultured Stone® and ProStone® products.

3.1.7. The ability of various fasteners to support the gravity and transverse loads induced by the products when installed over wood or steel framing and WSP with the addition of continuous insulation installed between the WSP and the Cultured Stone® and ProStone® products[5].

3.2. Use in applications requiring a fire-resistance rating are outside the scope of this evaluation.

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

4. Product Description and Materials:

4.1. Cultured Stone® and ProStone® are a manufactured, precast, artificial veneer product made from Portland cement, aggregate and mineral oxide colors used as adhered, non-bearing exterior veneer or as an interior finish.

4.2. Cultured Stone® and ProStone® products have the following characteristics:

4.2.1. Color and texture similar to various stone surfaces. Examples are shown in Figure 1.

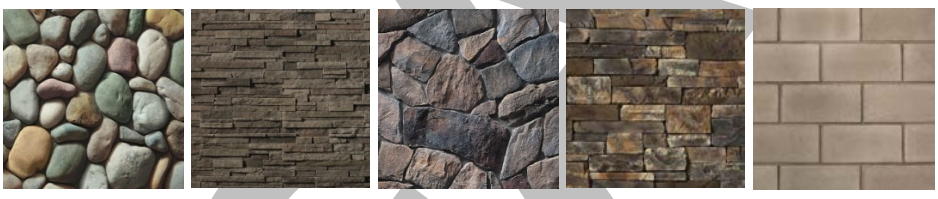

Figure 1: Examples of Cultured Stone® & ProStone® Finishes

4.2.2. Patterns have a maximum area of 720 square inches (0.464 m^2).

4.2.3. Patterns have a maximum dimension of 36" (914 mm).

4.2.4. Patterns have a maximum veneer weight of 15 lbs. per square foot (73.2 kg/m^2).

4.2.5. The total cladding system weight, including the mortar setting bed, lath and scratch coat, is up to 25 lbs. per square foot (122 kg/m^2).

5. Applications:

5.1. Wood- or Steel-Framed Walls and Wood Structural Panels

5.1.1. Cultured Stone® and ProStone® are used as an exterior wall covering in accordance with the applicable sections of *IBC* Chapter 14 and *IRC* Section R703 and are installed over wood- or steel-framed walls and WSP capable of supporting the imposed loads in accordance with *IBC* Section 1609 and *IRC* Section R301.2.1 including all required transverse wind loads.

5.1.2. Cultured Stone® and ProStone® are used as an exterior wall covering installed over wood- or steel-framed walls where the wood structural panels are over sheathed with continuous insulation. The maximum foam thickness for various fastener sizes and types is as shown in Table 1 and Table 2.

[5] In lieu of WSPs, 5/8" GWB or DensGlass is permitted

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Lath Fastener Through Continuous Insulation Into:	Lath Fastener –Type & Min. Size	Max. Veneer Weight (includes lath & mortar setting bed)	Max Distance from Face of Framing to Underside of Fastener Head[8]
Wood Framing	0.131" diameter nail	25 psf	0.5"
	0.148" diameter nail		0.75"
	0.162" diameter nail		1.0"
	TRUFAST SIP (LD or TP)		2.5"
	HeadLOK		3.0"
	0.131" diameter nail	22 psf	0.75"
	0.148" diameter nail		1.0"
	0.162" diameter nail		1.25"
	TRUFAST SIP (LD or TP)		2.75"
	HeadLOK		3.5"
	0.131" diameter nail	18 psf	1.0"
	0.148" diameter nail		1.25"
	0.162" diameter nail		1.5"
	TRUFAST SIP (LD or TP)		3.5"
	HeadLOK		4.25"
	0.131" diameter nail	15 psf	1.0"
	0.148" diameter nail		1.5"
	0.162" diameter nail		2.0"
	TRUFAST SIP (LD or TP)		4.25"
	HeadLOK		4.25"

1. Screws shall be self-drilling, self-tapping and have a wafer or pancake head with a minimum $^{5}/_{16}$" diameter.
2. Nails and screws shall penetrate wood framing a minimum of $1^{1}/_{4}$".
3. Maximum stud spacing is 16" o.c. Lath shall be attached vertically along each stud a maximum of 6" o.c.
4. Wood studs shall have a minimum specific gravity of 0.42.
5. For thicker continuous insulation applications, design is required in accordance with accepted engineering practice.
6. Lath shall be attached in accordance with Section 6.2.6.
7. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with *ASTM C578* or *ASTM C1289* and be qualified for wind pressure resistance in accordance with *ANSI/SBCA FS 100*.
8. The total distance from the face of the framing, to the underside of the fastener head shall not be more than the maximum distance listed above. This includes any additional sheathing materials, such as OSB, plywood,gypsum, DensGlass, rainscreen or airspace, incorporated in the design of the wall assembly. Cladding shall be attached to the furring in accordance with the manufacturer's installation instructions. Not all fasteners are commonly available in the lengths specified. Proprietary fasteners of equal strength and size are permitted.

Table 1: Fastener Requirements to Support Cladding Weight for Cultured Stone® & ProStone® Installation Over Continuous Insulation in Wood Framing

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Lath Fastener Through Continuous Insulation Into:	Lath Fastener – Type & Min. Size	Max. Veneer Weight (includes lath & mortar setting bed)	Max Distance from Face of Framing to Underside of Fastener Head[7]
Steel Framing	#8 (0.164" dia.) into 33 mil or thicker steel	25 psf	1.25"
	#10 (0.19" dia.) screws into 33 mil steel		1.75"
	TRUFAST SIP (LD or TP) into 33 mil		3.0"
	#10 (0.19" dia.) screws into 43 mil steel		3.5"
	#8 (0.164" dia.) into 33 mil or thicker steel	22 psf	1.75"
	#10 (0.19" dia.) screws into 33 mil steel		2.25"
	TRUFAST SIP (LD or TP) into 33 mil		3.5"
	#10 (0.19" dia.) screws into 43 mil steel		3.75"
	#8 (0.164" dia.) into 33 mil or thicker steel	18 psf	2.0"
	#10 (0.19" dia.) screws into 33 mil steel		2.5"
	TRUFAST SIP (LD or TP) into 33 mil		4.0"
	#10 (0.19" dia.) screws into 43 mil steel		4.0"
	#8 (0.164" dia.) into 33 mil or thicker steel	15 psf	2.5"
	#10 (0.19" dia.) screws into 33 mil steel		3.0"
	TRUFAST SIP (LD or TP) into 33 mil		4.0"
	#10 (0.19" dia.) screws into 43 mil steel		4.0"

1. Screws shall be self-drilling, self-tapping and have a wafer or pancake head with a minimum $^{5}/_{16}$" diameter.
2. Screws shall penetrate steel framing a minimum of $^{3}/_{8}$". For TRUFAST SIP LD minimum penetration shall be $^{3}/_{8}$" excluding tip.
3. Maximum stud spacing is 16" o.c. Lath shall be attached vertically along each stud a maximum of 6" o.c.
4. For thicker continuous insulation applications, design is required in accordance with accepted engineering practice.
5. Lath shall be attached in accordance with Section 6.2.6.
6. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with *ASTM C578* or *ASTM C1289* and be qualified for wind pressure resistance in accordance with *ANSI/SBCA FS 100*.
7. The total distance from the face of the framing, to the underside of the fastener head shall not be more than the maximum distance listed above. This includes any additional sheathing materials, such as OSB, plywood, gypsum, DensGlass, rainscreen or airspace, incorporated in the design of the wall assembly. Cladding shall be attached to the furring in accordance with the manufacturer's installation instructions. Not all fasteners are commonly available in the lengths specified. Proprietary fasteners of equal strength and size are permitted.

Table 2: Fastener Requirements to Support Cladding Weight for Cultured Stone® & ProStone® Installation Over Continuous Insulation in Steel Framing

5.1.3. Cultured Stone® and ProStone® are used as an exterior wall covering installed over wood- or steel-framed walls, where the furring is attached over the continuous insulation. For this application, the maximum foam thickness for various fastener sizes and types is as shown in Table 3.

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Furring Material	Framing Member	Cladding Weight	Fastener Type & Min. Size	Min. Fastener Penetration into Wall Framing	Fastener Spacing in Furring	Max Distance from Face of Framing to Underside of Fastener Head[12]
Min. 1x3 Wood Furring	Min. 2x Wood Stud	15 psf	Nail (0.120" shank; 0.271" head)	1¼"	8"	2.0"
			Nail (0.131" shank; 0.281" head)	1¼"	8"	2.25"
			#8 wood screw	1"	8"	2.25"
			¼" lag screw	1½"	12"	2.5"
		18 psf	Nail (0.120" shank; 0.271" head)	1¼"	8"	1.75"
			Nail (0.131" shank; 0.281" head)	1¼"	8"	2.0"
			#8 wood screw	1"	8"	2.0"
			¼" lag screw	1½"	12"	2.25"
		22 psf	Nail (0.120" shank; 0.271" head)	1¼"	8"	1.5"
			Nail (0.131" shank; 0.281" head)	1¼"	8"	1.75"
			#8 wood screw	1"	8"	1.75"
			¼" lag screw	1½"	12"	1.75"
		25 psf	Nail (0.120" shank; 0.271" head)	1¼"	8"	1.25"
			Nail (0.131" shank; 0.281" head)	1¼"	8"	1.5"
			#8 wood screw	1"	8"	1.5"
			¼" lag screw	1½"	12"	1.5"
Steel Hat Channel (min. 33 mil, 33 ksi)	Steel Stud (43 mil or thicker, 33 ksi)	15 psf	#10 screw (0.333" head)	Steel thickness +3 threads	12"	3.25"
					16"	2.5"
		18 psf			12"	2.75"
					16"	1.75"
		22psf			12"	2.25"
					16"	1.0"
		25 psf			12"	1.75"
					16"	0.5"

1. Maximum Cultured Stone® and ProStone® weight including lath and mortar bed is 25 psf.
2. Minimum ¾"-thick wood furring and wood studs with a minimum specific gravity of 0.42. Maximum stud spacing is 16" o.c.
3. Minimum 33 mil steel hat channel (33ksi) with ⅞" depth.
4. Corrosion-resistant, self-drilling, self-tapping screw fasteners for connection of siding to steel framing shall comply with the requirements of *AISI S200*. They shall have a wafer or pancake head or a washer with a diameter sufficient to prevent the head from pulling through the openings in the lath. Other approved fasteners of equivalent or greater diameter and bending strength shall be permitted.
5. Nail fasteners shall comply with *ASTM F1667*, except nail length shall be permitted to exceed *ASTM F1667* standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162" and 0.225" shall be 90,000; 90,000 and 80,000 psi respectively.
6. Furring shall be spaced a maximum of 16" o.c. in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached at the required fastener spacing. Furring strips installed in a horizontal direction shall be fastened at each stud with a number of fasteners equivalent to that required by the fastener spacing. [e.g., If the required nail spacing is 12" o.c. and the studs are 16" o.c., then two (2) nails would be required at each stud (16/12=1.33, round up to 2)]. In no case shall fasteners be spaced more than 16" apart.
7. Lag screws shall be installed with a standard cut washer.
8. Lag screws and wood screws shall be pre-drilled in accordance with *AWC NDS*. Approved self-drilling screws of equal or greater shear and withdrawal strength shall be permitted without pre-drilling.
9. A minimum 2x wood furring shall be used where the required siding fastener penetration into wood material exceeds ¾" (19.1 mm) and is not more than 1½" (38.1 mm), unless approved deformed shank siding nails or wall covering screws are used to provide equivalent withdrawal strength allowing the wall covering connection to be made to a 1x wood furring.
10. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with *ASTM C578* or *ASTM C1289* and be qualified for wind pressure resistance in accordance with *ANSI/SBCA FS 100*.
11. Lath shall be minimum 2.5 lb.-per-square-yard. metal lath having a minimum 0.020" thickness and shall be attached in accordance with Section 6.2.6. Tensile strength of the lath steel shall be minimum 43,900 psi.
12. The total distance from the face of the stud, to the underside of the fastener head shall not be more than the maximum thickness listed above. This includes any additional sheathing materials such as OSB, plywood, gypsum, DensGlass, rainscreen or airspace incorporated in the design of the wall assembly. Cladding shall be attached to the furring in accordance with the manufacturer's installation instructions. Not all fasteners are commonly available in the lengths specified. Proprietary fasteners of equal strength and size are permitted.
13. Materials in the assembly, other than the veneer, lath and mortar setting bed and furring are assumed to be separately attached and are not included in the fastener size calculations. Furring weight shall be included as part of the listed cladding weight.

Table 3: Furring Minimum Fastening Requirements for Application over Foam Plastic Insulating Sheathing to Support Cladding System Weight

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5.2. Concrete or Masonry Walls

5.2.1. Cultured Stone® and ProStone® are used as an exterior wall covering in accordance with the applicable sections of *IBC* Chapter 14 and *IRC* Section R703 and are installed over concrete or masonry walls capable of supporting the imposed loads in accordance with *IBC* Section 1609 and *IRC* Section R301.2.1, including all required transverse wind loads.

5.2.2. Cultured Stone® and ProStone® are used as an exterior wall covering installed over concrete or masonry walls, which are over sheathed with continuous insulation. The maximum foam thickness for various fastener sizes and types are as shown in Table 4.

Lath Fastener Through Continuous Insulation Into:	Lath Fastener Type	Max Distance from Face of Framing to Underside of Fastener Head[8]	Lath Fastener – Min. Size
Masonry (Medium/normal weight per *ASTM C90* Hollow CMU)	Tapcon Hex Screw	2.0"	1/4" x 4"
Concrete (minimum 2,500 psi)	Tapcon Hex Screw	0.5"	3/16" x 3"
		1.5"	1/4" x 3.5"
		2"	1/4" x 4"
		3"	5/16" x 5"

1. Maximum veneer weight including lath and mortar is 25 psf.
2. Lath shall be minimum 2.5 lb. metal lath having a minimum 0.020" thickness be attached in accordance with Section 6.2.6. Tensile strength of the lath steel shall be minimum 43,900 psi.
3. Lath shall be attached vertically a maximum of 7" o.c. and horizontally a maximum of 16" o.c.
4. Masonry fasteners shall penetrate a minimum of 1". Concrete fasteners shall penetrate a minimum of 1 1/2".
5. For thicker continuous insulation applications, design is required in accordance with accepted engineering practice.
6. Not all fasteners are commonly available in the lengths specified. Proprietary fasteners of equal strength and size are permitted.
7. Table values are based on the manufacturer's published fastener properties. The methodology for reducing the fastener capacities to account for the insulation are based on the *NDS* allowable lateral loads for fasteners as modified by *APA TR12* for use with a gap parameter for gravity load only (i.e., fasteners sized to support weight of cladding, while cantilevered from framing a distance equal to the foam sheathing thickness).
8. Maximum thickness of continuous insulation shall include any rain screen material, sheathing that does not serve as a nail base, and airspace between the cladding and the continuous insulation, where present.
9. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with *ASTM C578* or *ASTM C1289* and be qualified for wind pressure resistance in accordance with *ANSI/SBCA FS 100*.

Table 4: Fastener Requirements to Support Cladding Weight of Cultured Stone® & ProStone® Installation Over Continuous Insulation in Concrete or Masonry Construction

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5.2.3. Cultured Stone® and ProStone® are used as an exterior wall covering installed over concrete or masonry walls, where furring is attached over the continuous insulation. For this application, the maximum foam thickness for various fastener sizes and types are as shown in Table 5.

Furring Fastener Through Continuous Insulation Into:	Furring Material	Max Distance from Face of Framing to Underside of Fastener Head	Furring Fastener Type	Furring Fastener Min. Size
Masonry (lightweight per *ASTM C90* – hollow CMU)	Minimum 1" x 3" Wood Furring or Steel Hat Channel (Min. 33 mil)	1.5"	Masonry Nail	0.148" x 2.75"
Masonry (medium/normal per *ASTM C90* – hollow CMU)		0.5"	Tapcon Hex Screw	3/16" x 3"
		2.0"		1/4" x 5"
Concrete		2.0"		1/4" x 5"
		4.0"		1/4" x 6"

1. Maximum veneer weight including lath and mortar is 25 psf.
2. Maximum furring spacing is 16" o.c. for vertical applications and 7" o.c. for horizontal applications.
3. Wood furring shall be a minimum 3/4"-thick. Wood furring shall have a minimum specific gravity of 0.42.
4. Steel hat channel furring shall be a minimum 33 mil (33 ksi) thick steel with a 7/8" depth.
5. A minimum 2x wood furring shall be used where the required wall covering fastener penetration into wood material exceeds 3/4" (19.1 mm) and is not more than 1 1/2" (38.1 mm), unless approved deformed shank siding nails or siding screws are used to provide equivalent withdrawal strength allowing the wall covering connection to be made to a 1x wood furring
6. Masonry fasteners shall penetrate a minimum of 1". Concrete fasteners shall penetrate a minimum of 1 1/2".
7. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with *ASTM C578* or *ASTM C1289* and be qualified for wind pressure resistance in accordance with *ANSI/SBCA FS 100*.
8. Not all fasteners are commonly available in the lengths specified. Proprietary fasteners of equal strength and size are permitted.
9. Masonry nails shall be manufactured in accordance with *ASTM F1667*.
10. Tools used for driving pneumatic or powder actuated fasteners shall be adjusted to avoid over driving the fasteners and damaging the panel.

Table 5: Furring Minimum Fastening Requirements for Application over Continuous Insulation to Support Cladding System Weight in Concrete or Masonry Construction

5.3. Transverse Wind Loads

5.3.1. Cultured Stone® and ProStone® shall not be installed in areas where the design wind pressure exceeds the capacity of the cladding and its attachment to resist the load in accordance with Table 6.

5.3.2. Table 6 provides the maximum design wind pressure allowed for the installation of this product. The maximum wind speed that corresponds with this wind pressure is provided, to aid the user in determining where the product can be used. See the applicable building code for the maximum design wind speed allowed for the location of the building. The wind speed listed in Table 6 shall exceed the required design wind speed from the applicable code.

Exposure Category	Allowable Design Wind Pressure (psf)[2]	Maximum Wind Speed (mph) (V_{ult}/V_{asd})[1]
B	76	≤ 195/155
C		≤ 165/130
D		≤ 155/120

1. Listed wind speed is V_{ult}, per *ASCE 7-10*, and is the maximum allowed wind speed for the Exposure Category shown with a maximum Mean Roof Height (MRH) of 30', zone 4 and an effective wind area of 10 ft². The second wind speed capacity shown for each exposure category is the *ASCE 7-10* ultimate wind speed converted to V_{asd} for allowable stress design and rounded to the nearest 5 mph.
2. Design wind pressure per *ASCE 7-10* for components and cladding, Method 1 for the condition shown.
3. Maximum allowable wind speeds are based on the average ultimate loads tested for each condition divided by 1.5.
4. Pressure Equalization factor in accordance with *ASTM D5206*, Procedure B equals 1.0
5. Cultured Stone® and ProStone® installation shall be in accordance with the manufacturer's installation instructions and this TER.

Table 6: Maximum Wind Speeds for Cultured Stone® & ProStone®

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

5.5. For additional information or use in other applications, consult the manufacturer's installation instructions.

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6. Installation:

6.1. General

6.1.1. Cultured Stone® and ProStone® shall be installed in accordance with the published 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.

6.1.2. Installation is subject to the conditions of use set forth in Section 9.

6.2. Wood- or Steel-Framed Walls and Wood Structural Panels

6.2.1. Veneer must be applied to studs spaced a maximum of 16" o.c. (406 mm).

6.2.2. Cultured Stone® and ProStone® may be installed over WSP[6] with an intervening layer of continuous insulation and attached in accordance with Table 1.

6.2.3. Cultured Stone® and ProStone® may be installed over continuous insulation with no WSP and attached in accordance with Table 1.

6.2.3.1. Where WSPs are used, they shall be installed in accordance with the applicable building code and shall comply with one of the following minimum requirements:

6.2.3.1.1. Minimum $^{7}/_{16}$" Structural 1, Exposure 1 OSB complying with *U.S. DOC PS-2.*

6.2.3.1.2. Minimum ½" Structural 1 rated, exterior grade plywood complying with *U.S. DOC PS-1.*

6.2.4. Cultured Stone® and ProStone® must installed be over two (2) layers of a water-resistant barrier (WRB) in accordance with *IBC* Section 1404.2 and *IRC* Section R703.2. The base layer WRB may be liquid-applied, a sheet material, or a rigid continuous insulation with taped joints where the continuous insulation is approved for use as a WRB.

6.2.5. Weep screeds and code compliant flashing must be installed at the bottom of walls and flashing and at all horizontal terminations of the veneer.

6.2.5.1. The weep screed must comply with and be installed in accordance with *IBC* Section 2512.1.2 or *IRC* Section R703.7.2.1[7].

6.2.6. Veneer must be installed over 2.5 lb.-per-square-yard (1.4 kg/m^2) galvanized diamond mesh metal lath,3.4 lb.-per-square-yard (1.8 kg/m^2) $^{3}/_{8}$"-rib (9.5 mm) or paper-backed galvanized expanded metal lath, No. 18 gage (0.051"-thick [1.30 mm]) galvanized woven wire mesh applied or other code-approved lath of equal or better performance:

6.2.6.1. Per the manufacturer's installation instructions.

6.2.6.2. Over the WRB.

6.2.6.3. Fastened through continuous insulation to studs at 6" o.c. (152 mm) vertically.

6.2.6.4. Fasteners for wood studs (minimum specific gravity of 0.42) must be a minimum of 0.131"-shank-diameter galvanized nails.

6.2.6.5. Fasteners for steel studs must be a minimum $^{5}/_{16}$"-head-diameter (8 mm) corrosion resistant self-drilling and self-tapping pancake head screw of sufficient length to penetrate studs a minimum of $^{3}/_{8}$" (9.5 mm).

6.2.7. Alternately, installation over 3.4 lb.-per-square-yard (1.8 kg/m^2) $^{3}/_{8}$"-rib (9.5 mm) galvanized expanded metal lath without a paper backing is allowed, provided two (2) separate WRB layers are provided and all other requirements of Section 6.2.6 are met.

6.2.8. Cultured Stone® and ProStone® shall be adhered to the supporting walls with a ½"-thick to ¾"-thick (12.7 mm to 19.1 mm) mortar setting bed.

6.2.8.1. The mortar must comply with *IBC* Section 2103.2[8] or *IRC* Table R606.2.7[9] for the application.

[6] In lieu of WSPs, 5/8" GWB or DensGlass is permitted
[7] *2012 IRC* Section R703.6.2.1
[8] *2012 IBC* Section 2103.9 , *2009 IBC* Section 2103.8
[9] *2012 IRC* Table 607.1

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6.2.8.2. Other mortars of equal or greater performance shall be permitted, when installed in accordance with the manufacturer's installation instructions.

6.3. Concrete and Masonry Walls

6.3.1. Cultured Stone® and ProStone® may be installed over concrete or masonry walls with an intervening layer of continuous insulation and attached in accordance with Table 4.

6.3.2. Cultured Stone® and ProStone® may be installed over furring and continuous insulation and attached in accordance with Table 5.

6.3.3. Veneer must be installed over 2.5 lb.-per-square-yard (1.4 kg/m^2) galvanized diamond mesh metal lath, 3.4 lb.-per-square-yard (1.8 kg/m^2) $^3/_8$"-rib (9.5 mm) galvanized expanded metal lath, No. 18 gage (0.051"-thick [1.30 mm]) galvanized woven wire mesh applied, or other code-approved lath of equal or better performance:

6.3.3.1. Fastened through continuous insulation to concrete or masonry walls at a maximum of 7" o.c. (152 mm) vertically and 16" o.c. (406 mm) horizontally.

6.3.3.2. A WRB is not required in this application; however, a WRB is permitted and may be mechanically attached, liquid applied or taped foam plastic insulated sheathing (FPIS) seams.

6.3.4. Cultured Stone® and ProStone® shall be adhered to the supporting walls with a ½"-thick to ¾"-thick (12.7 mm to 19.1 mm) mortar setting bed.

6.3.4.1. The mortar must comply with *IBC* Section 2103.2, or *IRC* Table R606.2.7 for the application.

6.3.4.2. Other mortars of equal or greater performance shall be permitted.

6.4. All other installation and flashing details germane to the project shall be in accordance with the applicable building code and the manufacturer's installation instructions.

7. Test and Engineering Substantiating Data:

7.1. Report showing compliance with *ASTM E330* based on testing of transverse loads.

7.2. Report showing compliance with *ASTM C482* based on testing of the bond strength of the product.

7.3. The design approach and relevant test data for *ANSI/SBCA FS100* are addressed in the following references. They have also served as the basis for approval of similar connection requirements for the *2015 IRC* and *IBC*, as well as the *New York State Energy Code*.

7.3.1. *Fastening Systems for Continuous Insulation, Final Report 10-11*; New York State Energy Research and Development Authority (NYSERDA); Albany, NY; April 2010.

7.3.2. Baker, P. and Lepage, R.; *Cladding Attachment Over Thick Exterior Insulating Sheathing*; Prepared by the Building Science Corporation for the National Renewable Energy Laboratory on behalf of the U.S. Department of Energy's Building America Program; January 2014.

7.3.3. Baker, P.; *Initial and Long-Term Movement of Cladding Installed Over Exterior Rigid Insulation*; Prepared by the Building Science Corporation for the National Renewable Energy Laboratory on behalf of the U.S. Department of Energy's Building America Program; September, 2014.

7.4. Masonry Veneer Manufacturers Association Installation Guide.

7.5. Quality Control Manual for the Manufacturing of Boral Stone Products.

7.6. The product(s) evaluated by this TER fall within the scope of one or more of the model, state or local building codes for building construction. The testing and/or substantiating data used in this TER is limited to buildings, structures, building elements, construction materials and civil engineering related specifically to buildings.

7.7. The provisions of model, state or local building codes for building construction do not intend to prevent the installation of any material or to prohibit any design or method of construction. Alternatives shall use consensus standards, performance-based design methods or other engineering mechanics based means of compliance. This TER assesses compliance with defined standards, accepted engineering analysis, performance-based design methods, etc. in the context of the pertinent building code requirements.

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7.8. Some information contained herein is the result of testing and/or data analysis by other sources, which DrJ relies on to be accurate, as it undertakes its engineering analysis.

7.9. DrJ has reviewed and found the data provided by other professional sources are credible. The information in this TER conforms with DrJ's procedure for acceptance of data from approved sources.

7.10. DrJ's responsibility for data provided by approved sources conforms with *IBC* Section 1703 and any relevant professional engineering law.

7.11. Where appropriate, DrJ relies on the derivation of design values, which have been codified into law through codes and standards (e.g., *IRC*, *WFCM*, *IBC*, *SDPWS, NDS, ACI, AISI, PS-20, PS-2*, etc.). 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, concrete, etc), DrJ relies upon grade/properties provided by the raw material supplier to be accurate and conforming to the mechanical properties defined in the relevant material standard.

8. Findings:

8.1. Cultured Stone® and ProStone® meet the requirements for use as an exterior wall covering in accordance with *IBC* Section 1404.10 and the *IRC* Section R703.10.

8.2. Cultured Stone® and ProStone® are suitable for use as an exterior wall covering assembly when installed over wood- or steel-framed walls or WSP with an additional layer(s) of continuous insulation installed between the Cultured Stone® and ProStone® and the WSP in accordance with Section 5.1 of this TER.

8.3. Cultured Stone® and ProStone® are suitable for use as an exterior wall covering assembly when installed over continuous insulation without WSP in accordance with Section 5.1 of this TER.

8.4. Cultured Stone® and ProStone® are suitable for use as an exterior wall covering assembly when installed over concrete or masonry walls with an additional layer(s) of continuous insulation installed between the Cultured Stone® and ProStone® and the concrete or masonry walls in accordance with Section 5.2 of this TER.

8.5. *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*.

8.6. This product has been evaluated with 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 that are applicable to this evaluation, they are listed here:

8.6.1. No known variations

8.7. This TER uses professional engineering law, the building code, ANSI/ASTM consensus standards and generally accepted engineering practice as its criteria for all testing and engineering analysis. DrJ's professional engineering work falls under the jurisdiction of each state Board of Professional Engineers, when signed and sealed.

9. Conditions of Use:

9.1. Where required by 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.

9.2. Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the code official for review and approval.

9.3. 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, Registered Design Professional, etc.).

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9.4. Cultured Stone® and ProStone® products described in this TER comply with, or are a code compliant alternative material to, that specified in the codes described in Section 2, subject to the following conditions.

9.5. 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, this TER governs.

9.6. Installation shall be on exterior walls consisting of wood framing or steel framing capable of supporting the imposed loads, including transverse wind loads.

9.7. Two layers of WRB are required over the framing and WSP sheathing (where present). The base layer may be of sheet goods or rigid FPIS.

9.8. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with *ASTM C578* or *ASTM C1289* and be qualified for wind pressure resistance in accordance with *ANSI/SBCA FS100*.

9.9. Concrete or masonry walls shall be designed to resist shear (racking) load in accordance with the applicable code.

9.10. Where the seismic provisions of *IRC* Section R301.2.2 apply, the Cultured Stone® and ProStone® wall assembly shall not exceed the weight limits of *IRC* Section R301.2.2.1, unless an engineered design is provided in accordance with *IRC* Section R301.1.3.

9.11. Walls shall be braced to resist shear (racking) load by other means in accordance with the applicable code.

9.12. Exterior wall framing shall be limited to a maximum out of plane deflection of H/360.

9.13. Design

9.13.1. Building Designer Responsibility

9.13.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer for the Building and shall be in accordance with *IRC* Section R106 and *IBC* Section 107.

9.13.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with *IRC* Section R301 and *IBC* Section 1603.

9.13.2. Construction Documents

9.13.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.

9.14. Responsibilities

9.14.1. The information contained herein is a product, material, detail, design and/or application TER evaluated in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering practice, experience and technical judgment.

9.14.2. DrJ TERs provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated sections.

9.14.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.

9.14.4. This product is manufactured under a third-party quality control program in accordance with *IRC* Section R104.4 and R109.2 and *IBC* Section 104.4 and 110.4.

9.14.5. 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, and the TER shall be reviewed for code compliance by the Building Official.

9.14.6. 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.

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10. Identification:

10.1. Cultured Stone® products described in this TER are identified by the initials "C.S.V." on each piece.

10.2. Cultured Stone® and ProStone® products described in this TER are identified by a label on the packaging material bearing the manufacturer's name, product name, TER number, manufacturing plant location, product code, and other information to confirm code compliance.

10.3. Additional technical information can be found at culturedstone.com.

11. Review Schedule:

11.1. This TER is subject to periodic review and revision. For the most recent version of this TER, visit drjengineering.org.

11.2. For information on the current status of this TER, contact DrJ Engineering.

- Mission and Professional Responsibilities
- Product Evaluation Policies
- Product Approval – Building Code, Administrative Law and P.E. Law

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