DrJ™ CERTIFICATION

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Technical Evaluation Report

TER 1806-03

Stack-A-Stone Masonry Veneer

Stack-A-Stone LLC

Product:

Stack-A-Stone Masonry Veneer

Issue Date:

March 25, 2019

Revision Date:

March 31, 2020

Subject to Renewal:

March 31, 2020

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

1. Products Evaluated:

1.1. Stack-A-Stone Masonry Veneer

1.1.1. Mountain Ledge Quickfit

1.1.2. Classic Ledgestone

1.1.3. Field Stone

1.1.4. Shadow Ledgestone

1.2. For the most recent version of this Technical Evaluation Report TER), cisit 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.

1.3. 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.

1.4. 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.

1.5. 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.

1.6. DrJ's code compliance work:

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

1.6.2. 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.

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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. *ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field*

2.4. *ASTM C140 – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units*

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

2.6. *ASTM C666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing*

2.7. *ASTM C1063 – Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster*

2.8. *ASTM C1670 – Standard Specification for Adhered Manufactured Stone Masonry Veneer Units*

3. Performance Evaluation:

3.1. Stack-A-Stone products were evaluated in accordance with *IBC* Section 2103.1 to determine physical properties, including: shear bond, absorption, saturation density, compressive strength, freeze-thaw duration and linear shrinkage.

3.2. Thermal resistance, transverse wind loading, flame spread and smoke developed indexes, and use as an interior finish is outside the scope of this TER.

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

4. Product Description and Materials:

4.1. General

4.1.1. Stack-A-Stone products are manufactured, precast, concrete veneer products made from Portland cement, aggregate, water, admixtures and coloring used as adhered, non-bearing exterior veneer or as an interior finish.

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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.

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4.1.1.1. Color and texture similar to various stone or brick surfaces. Examples are shown in Figure 1.



Mountain Ledge Quickfit - Wicker



Classic Ledgestone - Virginia Slate



Fieldstone - Fieldstone



Shadow Ledgestone - Pennsylvania

Figure 1: Examples of Stack-A-Stone Product Finishes

4.2. Profiles

4.2.1. Mountain Ledge Quickfit

4.2.1.1. Panel Length: 5" to 17"

4.2.1.2. Panel Height: 4"

4.2.1.3. Thickness: 1" to 2-¼"

4.2.2. Classic Ledgestone

4.2.2.1. Panel Length: 4" to 20"

4.2.2.2. Panel Height: 1" to 5"

4.2.2.3. Thickness: ¾" to 2-¼"

4.2.3. Fieldstone

4.2.3.1. Panel Length: 5-½" to 14"

4.2.3.2. Panel Height: 5-½" to 14"

4.2.3.3. Thickness: 1" to 2"

4.2.4. Shadow Ledgestone

4.2.4.1. Panel Length: 6" to 17"

4.2.4.2. Panel Height: 1" to 4"

4.2.4.3. Thickness: 1" to 2"

4.2.5. Patterns have a nominal oven dry density less than 105 lb/ft^3 (1362 kg/m^3).

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5. Applications:

5.1. General

5.1.1. Stack-A-Stone products are used as a non-bearing exterior veneer in accordance with the applicable sections of *IBC* Section 2103.1 and *IBC* Section 1404.10, and *IRC* Section R703.12.

5.1.2. Stack-a-Stone products must be installed over sheathing/substrate capable of supporting the imposed loads in accordance with *IBC* Section 1609 and *IRC* Section R301.2.1, including all required transverse wind loads.

5.1.3. Stack-a-Stone products may be installed on wood- or steel-framed walls, with or without WSP sheathing, or onto masonry or concrete walls.

5.1.4. Stack-a-Stone products may be installed over continuous insulation on wood- or steel-framed walls, with or without WSP sheathing, or onto masonry or concrete walls that are sheathed with continuous insulation.

5.2. Shear Bond

5.2.1. Stack-A-Stone products have an average shear bond strength of 175 psi when tested in accordance with *ASTM C482*.

5.3. Water Absorption and Weight

5.3.1. Stack-A-Stone products were tested to assess their performance with regard to water absorption and weight in accordance with *ASTM C1670*, as specified in *IBC* Section 2103.1.

Table 1: Water Absorption and Saturation Density

Stack-a-Stone Masonry Veneer Absorption and Weight	
Absorption	19.7 pcf
Weight[2]	10.2 lb/ft^2

1. Tested in accordance with *ASTM C140*.
2. *ASTM C140* requires the weight be less than 15 lb/ft^2

5.4. Compressive Strength

5.4.1. Stack-A-Stone products were tested to assess their performance with regard to compressive strength in accordance with *ASTM C1670*, as specified in *IBC* Section 2103.1.

Table 2: Compressive Strength

Stack-a-Stone Masonry Veneer Compressive Strength	
Compressive Strength	3,560 psi

1. Tested in accordance with *ASTM C31*, which requires average compressive strength to be no less than 2,100 psi.

5.5. Freeze-thaw Durability

5.5.1. Stack-A-Stone products were tested to assess their performance with regard to freeze-thaw durability in accordance with *ASTM C1670*, as specified in *IBC* Section 2103.1.

Table 3: Freeze-Thaw Durability

Stack-a-Stone Masonry Veneer Freeze-thaw Durability	
Absorption	<1.5%

1. Tested in accordance with *ASTM C666*.

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5.6. Linear Shrinkage

5.6.1. Stack-A-Stone products were tested to assess their performance with regard to linear drying shrinkage in accordance with *ASTM C1670*, as specified in *IBC* Section 2103.1. Results confirm the length change between the 7-day reading (immediately following moist storage) and 28-day air curing reading does not exceed 0.10%.

6. Installation:

6.1. Stack-A-Stone products shall be installed in accordance with the manufacturer's published installation instructions, the Installation Guide and Detailing Options for Compliance with ASTM C1780 for Adhered Manufactured Stone Veneer, and this TER. In the event of a conflict between the manufacturer's installation instructions, the Masonry Veneer Manufacturer Association's Installation Guide and this TER, the more restrictive shall govern.

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

6.3. Veneer shall be applied to a wall framing system in which the studs are spaced a maximum of 16" o.c. (406 mm).

6.4. Stack-A-Stone products may be installed over continuous insulation on wood- or steel-framed walls, with or without WSP sheathing.

6.4.1. Where WSP sheathing is used, it shall be installed in accordance with the applicable building code or other standards as permitted by the building code (e.g., *SDPWS* or *WFCM*) and shall comply with one of the following minimum requirements:

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

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

6.5. Stack-A-Stone products may be installed on masonry or concrete walls with or without continuous insulation.

6.6. Stack-A-Stone products must be installed over two (2) layers of a water-resistant barrier (WRB) in accordance with *IBC* Section 1404.2, Section 2510.6 and *IRC* Section R703.2. The base layer WRB may be a liquid-applied, a sheet material, or a rigid continuous insulation with taped joints where the continuous insulation is approved for use as a WRB.

6.6.1. Exception: Where installed over concrete or masonry substrate, the WRB may not be required.

6.7. Weep screeds and code compliant flashing must be installed at the bottom of walls; the top of windows, doors and other fenestrations; and at all horizontal terminations of the veneer.

6.7.1. The weep screed must comply with and be installed in accordance with *IBC* Section 1405.10.1.2.1[2] and Section 2512.1.2 or *IRC* Section R703.7.2.1[3].

6.7.2. Exception: Where installed over concrete or masonry substrate, the weep screed is not required.

6.8. Veneer must be installed over 2.5 lb.-per-square-yard (1.4 kg/m^2) galvanized diamond mesh metal lath, 3.4 lb/yd^2 (1.8 kg/m^2) $^{3}/_{8}$"-thick (9.5 mm) galvanized expanded metal lath, 18 gage [0.051"-thick (1.30 mm)] galvanized woven wire mesh, or other code-approved lath of equal or better performance.

6.9. Lath shall be:

6.9.1. Installed per the manufacturer's installation instructions or *ASTM C1063*.

6.9.2. Installed over the two (2) WRB layers, unless the following conditions are met:

6.9.2.1. Lath is paper-backed, in which case only one (1) additional layer of WRB is required, except as noted in Section 6.7.

6.9.2.2. If the foam sheathing has been qualified by the manufacturer to perform as a layer of WRB, then only one (1) additional layer of WRB is required.

[2] *2012 IBC* Section 1405.10.1.2
[3] *2012 IRC* Section R703.6.2.1

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6.9.2.3. If a rain screen is used, only one (1) additional layer of WRB is required, in accordance with *IBC* Section 2510.6.

6.9.3. Fastened through continuous insulation to each stud in accordance with the lath manufacturer's installation instructions.

6.9.4. Attached to wood, steel or concrete substrates.

6.9.5. When the lath is installed over furring, the furring shall be fastened to the wood, steel or concrete substrate in accordance with an approved design capable of transferring all applied loads including but not limited to dead loads and transverse wind loads.

6.10. Stack-A-Stone products shall be adhered to the supporting walls with a ½"-thick to ¾"-thick (12.7 to 19.1 mm) mortar setting bed.

6.10.1. The mortar shall comply with *IBC* Section 2103.2[4] or *IRC* Table R606.2.7[5] for the application.

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

6.11. 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. Structural properties testing performed by National Concrete Masonry Association Research & Development Laboratory.

7.2. Quality Control Manual for the Manufacturing of Stack-A-Stone Products.

7.3. Installation Guide and Detailing Options for Compliance with ASTM C1780 for Adhered Manufactured Stone Veneer.

7.4. 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.

7.5. 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.

7.6. 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.

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

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

7.9. 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 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.

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[4] *2012 IBC* Section 2103.9
[5] *2012 IRC* Table R607.1

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8. Findings:

8.1. Stack-A-Stone products described in this TER comply with, or are a code compliant alternative material as specified in the codes listed in Section 2.

8.2. *IBC* Section 104.11 and *IRC* Section R104.11 (*IFC* Section 104.9 is similar) state:

> **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 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:

8.3.1. No known variations

8.4. This TER uses professional engineering law, the building code, ANSI/ASTM consensus standards and generally accepted engineering practice as its acceptance 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.

9.4. The Stack-A-Stone products described in this TER comply with, or are a code compliant alternative material as specified in the codes listed in Section 2, subject to the following conditions:

9.4.1. Where required by the jurisdiction in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.

9.4.2. Installation shall comply with the manufacturer's installation instructions, the MVMA installation Guide, and this TER. In the event of a conflict between the manufacturer's installation instructions, the MVMA Installation Guide and this TER, the more restrictive shall govern.

9.4.3. Installation on exterior walls shall consist of wood framing, steel framing, masonry or concrete capable of supporting the imposed loads, including transverse wind loads.

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

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

9.4.6. Exterior wall framing shall be limited to a maximum out-of-plane deflection of H/360 (H equals the height of the wall).

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9.5. Design

9.5.1. Building Designer Responsibility

9.5.1.1. 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.

9.5.1.2. 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.

9.5.2. Construction Documents

9.5.2.1. 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.

9.6. Responsibilities

9.6.1. 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.

9.6.2. DrJ TERs provide an assessment of only those attributes specifically addressed in Section 3.

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

9.6.4. 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.

9.6.5. 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.

9.6.6. 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.

10. Identification:

10.1. Stack-A-Stone 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.

10.2. Additional technical information can be found at stackastone.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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