

Listing and Technical Evaluation Report™

Report No: 1401-02



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Carlisle SynTec Systems VacuSeal™ Vent System

Trade Secret Report Holder:

Carlisle SynTec Systems

Phone: 800-479-6832

Website: www.carlisesyntec.com

Email: robert.patton@carlisleccm.com

CSI Designations:

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 05 00 - Membrane Roofing

Section: 07 07 00 - Roof Accessories

1 Innovative Product Evaluated¹

1.1 VacuSeal Roof Vent

2 Product Description and Materials

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

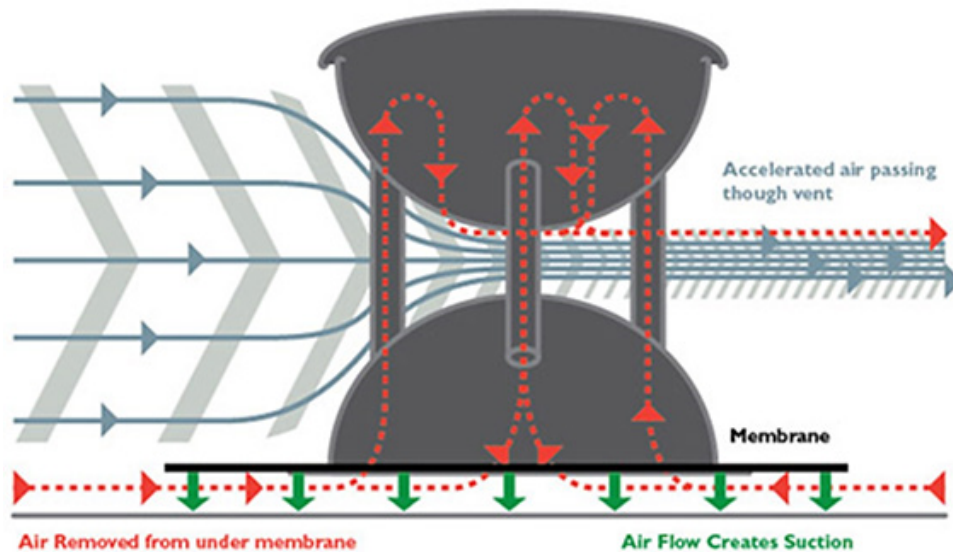


Figure 1. Schematic of VacuSeal Roof Vent Operation



2.2 VacuSeal Roof Vent System Description

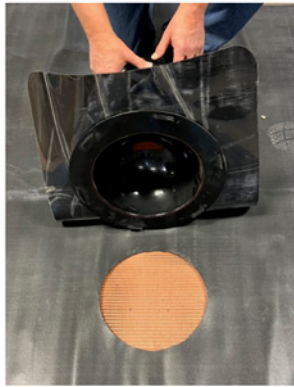
- 2.2.1 VacuSeal Roof Vent is a roof anchoring system for single-ply roof membranes.
- 2.2.2 VacuSeal Roof Vent is a patented technology under U.S. Patent Nos. 7,001,266 and 7,607,974.
- 2.2.3 VacuSeal Roof Vent draws air from under the roof membrane to create a negative pressure (suction) that prevents the membrane from lifting off the roof deck.
- 2.2.4 VacuSeal Roof Vent uses the Bernoulli Principle and the Venturi effect, as shown in **Figure 1**, to create the negative pressure beneath the roof membrane.
 - 2.2.4.1 The Bernoulli Principle states that an increase in the speed of a fluid (air) causes a decrease in the fluid pressure.
 - 2.2.4.2 The Venturi effect is an application of the Bernoulli Principle, which states that a fluid flowing through a constricted section of a tube undergoes an increase in velocity and a decrease in pressure.
- 2.2.5 As the wind blows through the narrow gap, it accelerates which lowers the pressure and creates suction.
- 2.2.6 The three hollow legs, which support the upper dome above the lower dome, allow the suction to draw air from under the roof membrane to a port located on the bottom of the upper dome, as shown in **Figure 1**.
- 2.2.7 Distribution strips are placed immediately beneath the roofing membrane to allow airflow to the VacuSeal Roof Vent. The strips connect the vents to the perimeter and corners of the roof to ensure air under the membrane can be removed (see **Figure 2**).
- 2.2.8 VacuSeal Roof Vents are placed over the intersection of distribution pathways at openings cut in the membrane (**Figure 2**).
- 2.2.9 The lower hemisphere of the VacuSeal Roof Vent has a flange for attaching the roof membrane to the vent (see **Figure 2**).
- 2.2.10 VacuSeal Roof Vents are located according to a layout plan provided for each project. To achieve the highest level of efficiency, the VacuSeal Roof Vents should be positioned a sufficient distance from perimeter edge to ensure that they receive airflow at a wind velocity value that is high enough to enable the adequate operation of the VacuSeal Roof Vent (**Figure 2**).



Distribution Strips Connect the Roof Perimeter to the VacuSeal Roof Vent



Roof Membrane is Placed Over the Distribution Strips



An Opening is Cut in the Roof Membrane for the VacuSeal Roof Vent



Skirt on the VacuSeal Roof Vent is Adhered Using Double-Sided Butyl Tape or hot air welded, depending on the skirt material, to the Roofing Membrane



Position of VacuSeal Roof Vents are Staggered to Accommodate Variations in Wind Speed on a Completed Roof Application

Figure 2. Photos of VacuSeal Roof Vent System

2.3 Materials

2.3.1 VacuSeal Roof Vents:

2.3.1.1 VacuSeal Roof Vents are manufactured from UV-resistant PVC.

2.3.2 Distribution Strips:

2.3.2.1 The distribution strip is a 10" wide polypropylene mesh mat that allows unrestricted airflow under the membrane.



2.3.3 Roofing Membrane:

2.3.3.1 VacuSeal Roof Vents are used with Carlisle SynTec Systems approved membranes.

2.3.4 Termination Bar:

2.3.4.1 The termination bar used for securing the edges of the roof membrane shall be tested for resistance in accordance with Test Methods RE-1, RE-2, and RE-3 of ANSI/SPRI ES-1 per [IBC Section 1504.6](#).²

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

3 Definitions

- 3.1 New Materials³ are defined as building materials, equipment, appliances, systems, or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.⁴ The design strengths and permissible stresses shall be established by tests⁵ and/or engineering analysis.⁶
- 3.2 Duly Authenticated Reports⁷ and Research Reports⁸ are test reports and related engineering evaluations, which are written by an approved agency⁹ and/or an approved source.¹⁰
- 3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).¹¹
- 3.3 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.
- 3.4 An approved source is “approved” when a professional engineer (i.e., Registered Design Professional) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.¹²
- 3.5 Testing and/or inspections conducted for this Duly Authenticated Report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed Registered Design Professional (RDP).
- 3.5.1 The Center for Building Innovation (CBI) is ANAB¹³ ISO/IEC 17025 and ISO/IEC 17020 accredited.
- 3.6 The regulatory authority shall enforce¹⁴ the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing¹⁵ stating the nonconformance and the path to its cure.
- 3.7 The regulatory authority shall accept Duly Authenticated Reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.¹⁶
- 3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.¹⁷ Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.¹⁸
- 3.9 Approval equity is a fundamental commercial and legal principle.¹⁹



4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation²⁰

4.1 Standards

- 4.1.1 ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures
- 4.1.2 UL 1897: Uplift Tests for Roof Covering Systems

4.2 Regulations

- 4.2.1 IBC – 15, 18, 21: International Building Code®
- 4.2.2 IRC – 15, 18, 21: International Residential Code®
- 4.2.3 IECC – 15, 18, 21: International Energy Conservation Code®
- 4.2.4 FBC-B—20, 23: Florida Building Code – Building²¹ (FL 42724)
- 4.2.5 FBC-R—20, 23: Florida Building Code – Residential²¹ (FL 42724)

5 Listed²²

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

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 Structural Applications

- 6.1.1 The VacuSeal Roof Vent system is used as a hold-down device to resist wind uplift forces on single-ply membrane systems and has been tested in accordance with UL 1897 per IBC Section 1504.4.1.²³
- 6.1.2 VacuSeal Roof Vent system is used as an alternative attachment method to a mechanically attached or fully adhered roof membrane.
- 6.1.3 VacuSeal Roof Vent can also be used for recovering existing roof or as a reroofing application in accordance with **Section 6.2**.
- 6.1.4 *Design:*
 - 6.1.4.1 **Table 1** lists the allowable uplift resistance for VacuSeal Roof Vent system.

Table 1. Nominal Uplift Resistance for the VacuSeal Roof Vent^{1,2,3}

Model Number	Nominal Wind Uplift Resistance (psf)
VacuSeal Roof Vent	195
SI: 1 psf = 0.0479 kN/m ² 1. Tested in accordance with UL 1897. 2. Design wind loads shall be in accordance with ASCE 7. 3. Perimeter enhancements are additive to the allowable wind uplift resistance in accordance with Section 6.1.4.2.	



- 6.1.4.2 The uplift resistance provided by the fasteners in the termination bar (**Figure 3**) around the roof perimeter and at penetrations can be added to the uplift resistance of the VacuSeal Roof Vents given in **Table 1**.
- 6.1.4.3 The total allowable uplift resistance provided by the VacuSeal Roof Vent and the mechanical fasteners shall be greater than the design wind pressures calculated in accordance with **Section 6.1.6**.
- 6.1.4.4 The factor of safety for the VacuSeal Roof Vent system shall be calculated as the total nominal uplift resistance provided by the VacuSeal Roof Vents and the mechanical fasteners in pounds divided by the total wind uplift force in pounds.
 - 6.1.4.4.1 The nominal (ultimate) uplift resistance for the VacuSeal Roof Vents in pounds is determined by multiplying the nominal uplift resistance of the VacuSeal Roof Vent in **Table 1** by the total area of the roof.
 - 6.1.4.4.2 The nominal uplift resistance for the mechanical fasteners is determined as the number of fasteners in the termination bar around the roof perimeter and at penetrations times the nominal uplift capacity per fastener given in the manufacturer literature.
 - 6.1.4.4.3 The total wind uplift force in pounds is calculated as the sum of the design wind pressures for the field, perimeter and corners of the roof calculated in accordance with **Section 6.1.6** multiplied by the area of the field, perimeter and corners of the roof, respectively.
- 6.1.5 The layout of the VacuSeal Roof Vents must meet the following minimum requirements:
 - 6.1.5.1 The first row of VacuSeal Roof Vents around the perimeter of the roof shall be staggered.
 - 6.1.5.2 The first row of VacuSeal Roof Vents from the perimeter edge shall be located, at a minimum, in accordance with the following:
 - 6.1.5.2.1 **Table 2** for roofs with a 10,000 ft² area
 - 6.1.5.2.2 **Table 3** for roofs with a 25,000 ft² area
 - 6.1.5.2.3 **Table 4** for roofs with a 50,000 ft² area
 - 6.1.5.2.4 **Table 5** for roofs with a 100,000 ft² area
 - 6.1.5.2.5 For roofs over 100,000 ft² and/or greater than 150 ft in height, the minimum placement distance from the parapet wall to the vent is 9'.
 - 6.1.5.2.6 For roof areas less than what is shown in the tables, use of the next highest value in the table is permitted (i.e., for a 20,000 ft² roof, use 25,000 ft²).
 - 6.1.5.2.7 "Max" values listed in the following tables represent the distance from the roof perimeter where the wind velocity approaches a maximum speed.
 - 6.1.5.3 See **Figure 3** for an example of VacuSeal Roof Vent layout.



Table 2. Minimum Required Distance From Perimeter Edge to VacuSeal Roof Vent and Distance From the Roof Perimeter Where Wind Velocity Approaches its Maximum Speed, 10,000 Ft² Roof Area

Building Height ³ (ft)	Parapet Height (ft)	Ultimate Wind Speed ^{1,2} (mph)									
		70		100		120		160		200	
		Min Distance from Perimeter to Vent / Distance for Max Wind Speed									
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
75	0	9	45	9	45	9	45	9	45	9	45
	1	9	27	9	27	9	27	9	27	9	27
	3	9	36	9	36	9	36	9	36	9	36
	6	9	36	9	36	9	36	9	36	9	36
	10	9	45	9	45	9	45	9	45	9	45
100	0	9	45	9	45	9	45	9	45	9	45
	1	9	36	9	36	9	36	9	36	9	36
	3	9	45	9	45	9	45	9	45	9	45
	6	9	54	9	54	9	54	9	54	9	54
	10	9	54	9	54	9	54	9	54	9	54
125	0	9	36	9	36	9	36	9	36	9	36
	1	9	36	9	36	9	36	9	36	9	36
	3	9	36	9	36	9	36	9	36	9	36
	6	9	45	9	45	9	45	9	45	9	45
	10	9	45	9	45	9	45	9	45	9	45
150	0	9	45	9	45	9	45	9	45	9	45
	1	9	36	9	36	9	36	9	36	9	36
	3	9	45	9	45	9	45	9	45	9	45
	6	9	63	9	63	9	63	9	63	9	63
	10	9	54	9	54	9	54	9	54	9	54

SI: 1" = 25.4 mm, 1 mph = 1.61 km/h

- Linear interpolation is permitted.
- Ultimate wind speeds are based on ASCE 7-16 and ASCE 7-22. Ultimate wind speeds, V_{ult} , can be converted to nominal wind speeds, V_{asd} , using the equation, $V_{asd} = V_{ult} \sqrt{0.6}$.
- For building heights less than 75', the minimum distance from the perimeter edge to the vent is 9'.



Table 3. Minimum Required Distance From Perimeter Edge to VacuSeal Roof Vent and Distance From the Roof Perimeter Where Wind Velocity Approaches its Maximum Speed, 25,000 Ft² Roof Area

Building Height ³ (ft)	Parapet Height (ft)	Ultimate Wind Speed ^{1,2} (mph)									
		70		100		120		160		200	
		Min Distance from Perimeter to Vent / Distance for Max Wind Speed									
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
75	0	9	54	9	54	9	54	9	54	9	54
	1	9	27	9	27	9	27	9	27	9	27
	3	9	45	9	45	9	45	9	45	9	45
	6	9	18	9	18	9	18	9	18	9	18
	10	9	63	9	63	9	63	9	63	9	63
100	0	9	45	9	45	9	45	9	45	9	45
	1	9	36	9	36	9	36	9	36	9	36
	3	9	45	9	45	9	45	9	45	9	45
	6	9	72	9	72	9	72	9	72	9	72
	10	9	27	9	27	9	27	9	27	9	27
125	0	9	72	9	72	9	72	9	72	9	72
	1	9	114	9	114	9	114	9	114	9	114
	3	9	81	9	81	9	81	9	81	9	81
	6	9	18	9	18	9	18	9	18	9	18
	10	9	72	9	72	9	72	9	72	9	72
150	0	9	54	9	54	9	54	9	54	9	54
	1	9	54	9	54	9	54	9	54	9	54
	3	9	63	9	63	9	63	9	63	9	63
	6	9	81	9	81	9	81	9	81	9	81
	10	9	36	9	36	9	36	9	36	9	36

SI: 1" = 25.4 mm, 1 mph = 1.61 km/h

- Linear interpolation is permitted.
- Ultimate wind speeds are based on ASCE 7-16 and ASCE 7-22. Ultimate wind speeds, V_{ult} , can be converted to nominal wind speeds, V_{asd} , using the equation, $V_{asd} = V_{ult} \sqrt{0.6}$.
- For building heights less than 75', the minimum distance from the perimeter edge to the vent is 9'.



Table 4. Minimum Required Distance From Perimeter Edge to VacuSeal Roof Vent and Distance From the Roof Perimeter Where Wind Velocity Approaches its Maximum Speed, 50,000 Ft² Roof Area

Building Height ³ (ft)	Parapet Height (ft)	Ultimate Wind Speed ^{1,2} (mph)									
		70		100		120		160		200	
		Min Distance from Perimeter to Vent / Distance for Max Wind Speed									
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
75	0	9	45	9	45	9	45	9	45	9	45
	1	9	45	9	45	9	45	9	45	9	45
	3	9	72	9	72	9	72	9	72	9	72
	6	9	27	9	27	9	27	9	27	9	27
	10	9	36	9	36	9	36	9	36	9	36
100	0	9	111	9	111	9	111	9	111	9	111
	1	9	135	9	135	9	135	9	135	9	135
	3	9	81	9	81	9	81	9	81	9	81
	6	9	99	9	99	9	99	9	99	9	99
	10	9	72	9	72	9	72	9	72	9	72
125	0	9	99	9	99	9	99	9	99	9	99
	1	9	135	9	135	9	135	9	135	9	135
	3	9	63	9	63	9	63	9	63	9	63
	6	9	36	9	36	9	36	9	36	9	36
	10	9	36	9	36	9	36	9	36	9	36
150	0	9	63	9	63	9	63	9	63	9	63
	1	9	135	9	135	9	135	9	135	9	135
	3	9	72	9	72	9	72	9	72	9	72
	6	9	54	9	54	9	54	9	54	9	54
	10	9	45	9	45	9	45	9	45	9	45

SI: 1" = 25.4 mm, 1 mph = 1.61 km/h

- Linear interpolation is permitted.
- Ultimate wind speeds are based on ASCE 7-16 and ASCE 7-22. Ultimate wind speeds, V_{ult} , can be converted to nominal wind speeds, V_{asd} , using the equation, $V_{asd} = V_{ult} \sqrt{0.6}$.
- For building heights less than 75', the minimum distance from the perimeter edge to the vent is 9'.



Table 5. Minimum Required Distance From Perimeter Edge to VacuSeal Roof Vent and Distance From the Roof Perimeter Where Wind Velocity Approaches its Maximum Speed, 100,000 Ft² Roof Area

Building Height ³ (ft)	Parapet Height (ft)	Ultimate Wind Speed ^{1,2} (mph)									
		70		100		120		160		200	
		Min Distance from Perimeter to Vent / Distance for Max Wind Speed									
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
75	0	9	54	9	54	9	54	9	54	9	54
	1	9	27	9	27	9	27	9	27	9	27
	3	9	54	9	54	9	54	9	54	9	54
	6	9	102	9	102	9	102	9	102	9	102
	10	9	72	9	72	9	72	9	72	9	72
100	0	9	102	9	102	9	102	9	102	9	102
	1	9	54	9	54	9	54	9	54	9	54
	3	9	36	9	36	9	36	9	36	9	36
	6	9	54	9	54	9	54	9	54	9	54
	10	9	54	9	54	9	54	9	54	9	54
125	0	9	54	9	54	9	54	9	54	9	54
	1	9	54	9	54	9	54	9	54	9	54
	3	9	54	9	54	9	54	9	54	9	54
	6	9	54	9	54	9	54	9	54	9	54
	10	9	81	9	81	9	81	9	81	9	81
150	0	9	36	9	36	9	36	9	36	9	36
	1	9	102	9	102	9	102	9	102	9	102
	3	9	54	9	54	9	54	9	54	9	54
	6	9	54	9	54	9	54	9	54	9	54
	10	9	81	9	81	9	81	9	81	9	81

SI: 1" = 25.4 mm, 1 mph = 1.61 km/h

1. Linear interpolation is permitted.
2. Ultimate wind speeds are based on ASCE 7-16 and ASCE 7-22. Ultimate wind speeds, V_{ult} , can be converted to nominal wind speeds, V_{asd} , using the equation, $V_{asd} = V_{ult} \sqrt{0.6}$.
3. For building heights less than 75', the minimum distance from the perimeter edge to the vent is 9'.



- 6.1.5.4 The maximum spacing between the VacuSeal Roof Vents along the perimeter of the roof is 50' o.c (see **Figure 3**).
- 6.1.5.5 If the roof spans 200' or more between perimeter edge in both directions, a second row of VacuSeal Roof Vents around the perimeter of the roof must be provided.
 - 6.1.5.5.1 The maximum spacing between the VacuSeal Roof Vents in the second row is 125' o.c.
- 6.1.5.6 The dimensions of the roof shall be sufficient to allow a minimum of two (2) VacuSeal Roof Vents to be placed along each side.
- 6.1.5.7 If the roof is separated by interior parapets, expansion joints, roof area dividers, etc., each portion of the roof shall be designed as a separate roof.
- 6.1.6 Wind load pressures on the roof membrane that are to be resisted by the VacuSeal Roof Vent system shall be determined in accordance with ASCE 7 per IBC Section 1504.4²⁴ and IBC Section 1609.5.
 - 6.1.6.1 The roof membrane shall be designed to resist the design wind load pressures for components and cladding in accordance with ASCE 7 Chapter 30.
 - 6.1.6.2 The design wind speeds shall be for the Risk Category determined from the applicable building code, unless a higher Risk Category is specified on the Construction Documents.
 - 6.1.6.2.1 For roofs designed in accordance with the recommendations of FM LPDS 1-28, the design wind speeds shall be for Risk Category III-IV, regardless of the actual Risk Category for the building.
 - 6.1.6.3 The effective wind area of the roof membrane shall be determined in accordance with ASCE 7, unless a smaller effective wind area is specified on the Construction Documents.
 - 6.1.6.3.1 For roofs designed in accordance with the recommendations of FM LPDS 1-28, the wind pressures shall be based on a maximum 10 ft² effective wind area, regardless of the actual effective area of the roof membrane.
- 6.1.7 See **Appendix B. Example Design Layout** for a design example with the wind pressure and factor of safety calculations, along with a roof layout for the VacuSeal Roof Vents.
- 6.2 *Roof Recovering*
 - 6.2.1 The VacuSeal Roof Vent system may be installed without first removing the existing layers of roof coverings in accordance with Exception 3 of IBC Section 1512.2.1.1.²⁵
 - 6.2.1.1 VacuSeal Roof Vents create a suction force, which transmits the wind uplift forces directly to the structural system of the roof without relying on attachment to the existing roof or roof covering by means of adhesives or mechanical fasteners.
 - 6.2.1.2 Since mechanical fasteners are not used by the VacuSeal Roof Vent system, the ability of the existing roof deck to serve as a nailing base and the depth of the existing layers of roof coverings are not of concern.
 - 6.2.2 The VacuSeal Roof Vent system may be used to recover an existing roof without first removing the existing layers of roof coverings if the following conditions are met:
 - 6.2.2.1 The existing roof deck and structural components shall be capable of supporting the additional uplift and/or gravity loads due to added layers of roof covering material in accordance with IBC Section 3301.2.1.²⁶
 - 6.2.2.2 The existing roof deck and structural components shall also be capable of supporting the additional loads due to the construction activities.
 - 6.2.2.3 The existing roof covering shall not be wood shake, slate, clay, cement or asbestos-cement tile.
- 6.3 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science and fire science.



7 Certified Performance²⁷

- 7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.²⁸
- 7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.²⁹

8 Regulatory Evaluation and Accepted Engineering Practice

- 8.1 VacuSeal Roof Vent complies with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:
 - 8.1.1 This report examines the ability of the VacuSeal Roof Vent to resist wind uplift forces for the following conditions:
 - 8.1.1.1 Performance of VacuSeal Roof Vents used with single-ply roof membranes installed on low-slope roofs.
- 8.2 Any building code, regulation, and/or accepted engineering evaluations (i.e., research reports, Duly Authenticated Reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP/approved sources. DrJ is qualified³⁰ to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.
- 8.3 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.
- 8.4 Any regulation specific issues not addressed in this section are outside the scope of this report.

9 Installation

- 9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report and the applicable building code.
- 9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.
- 9.3 A copy of the published manufacturer installation instructions shall be available at all times on the jobsite during installation.
- 9.4 All contractors using the VacuSeal Roof Vent system must be certified by Carlisle SynTec Systems.
- 9.5 Installation of the roofing membrane shall be in accordance with the roofing membrane manufacturer specifications and the approved Construction Documents.
- 9.6 The roof shall have flashing installed in accordance with IBC Section 1503.2 and the flashing manufacturer installation instructions.
- 9.7 *Installation Procedure*
 - 9.7.1 Depending on the roof application, the roof surface may need to be sealed to ensure that air infiltration is minimized in all areas of the roof.
 - 9.7.1.1 All equipment, curb and parapet wall penetrations in the roofing deck structure need to be sealed for optimal performance of the VacuSeal Roof Vent system.
 - 9.7.1.2 Openings in the deck shall be air sealed with appropriate materials to achieve the intended purpose.

- 9.7.2 If two (2) layers of insulation are installed over the roof deck, the joints should be staggered in both directions to decrease air movement. Roof cover boards should be applied when appropriate.
- 9.7.3 Distribution strips shall be installed over the roof deck or insulation board to create a pathway for airflow under the roofing membrane. The strips shall be tacked into position with bonding adhesive or fastened using plates and screws. The layout of the distribution strip shall be as shown on the drawings provided for the project.
- 9.7.3.1 Around the roof perimeter, three (3) distribution strips shall connect each VacuSeal Roof Vent to the perimeter edge: one (1) distribution strip shall run perpendicular to the perimeter edge to the VacuSeal Roof Vent, and the other two (2) distribution strips shall run diagonally from the VacuSeal Roof Vent to the point on the perimeter edge midway between the VacuSeal Roof Vents.
- 9.7.3.2 See **Figure 3** for an example of the distribution strip layout for the perimeter VacuSeal Roof Vents.

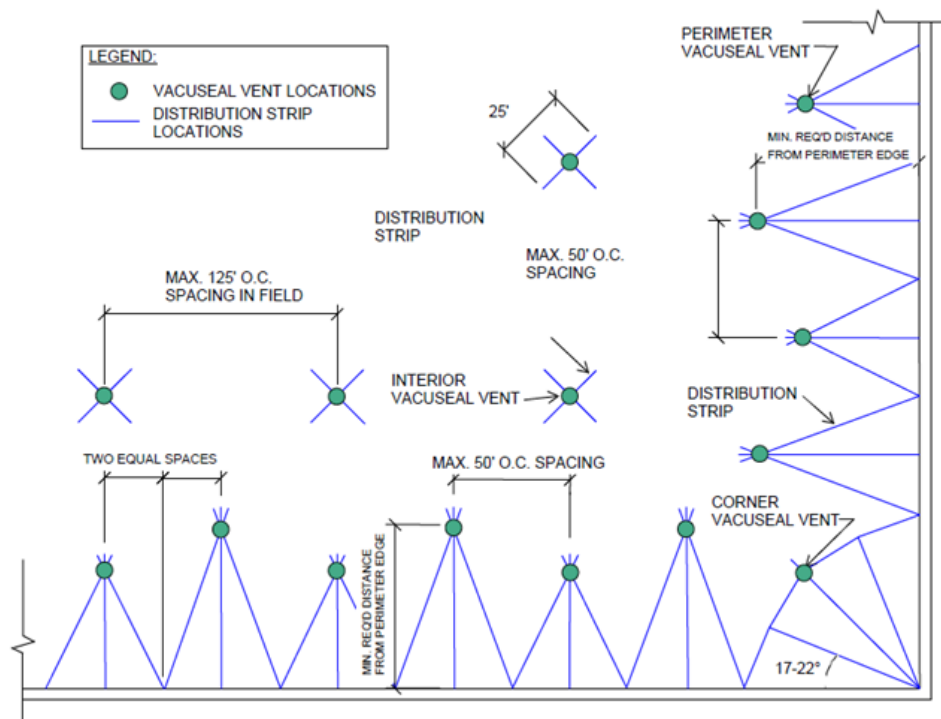


Figure 3. Distribution Strip Layout for VacuSeal Roof Vents

- 9.7.3.3 At re-entrant roof corners, three (3) distribution strips shall radiate from the corner.
- 9.7.3.3.1 The center strip shall be at an angle of approximately 45° to each of the perimeter edge and connect directly to the VacuSeal Roof Vent. The remaining two (2) distribution strips shall radiate from the corner at an angle of approximately 17° - 22° to the perimeter edge.
- 9.7.3.3.1.1 Where obstructions occur on the roof such as HVAC equipment locations, place the vents and strips such that the angle of the center strip is as close to 45° to each of the perimeter edge as possible, and the angle of the remaining distribution strips are as close to 17° - 22° to the perimeter edge as possible.
- 9.7.3.4 At interior vent locations, two (2) 25' long distribution strips shall be laid out in an "X" pattern with the VacuSeal Roof Vent at the center, as shown in **Figure 3**.
- 9.7.3.5 The distribution strips shall be routed around any openings/obstructions in its path.



- 9.7.4 All intersections of the distribution strips where the VacuSeal Roof Vents are to be located shall be marked by placing an object at the intersection to create a rise in the membrane once it is rolled out.
- 9.7.5 The roofing membrane is loose laid on top of the roof deck or insulation boards and distribution strips. During placement, edges of the roofing membrane can be welded temporarily to keep rain or external elements from getting beneath the roofing membrane.
- 9.7.6 A 10" diameter opening is cut in the membrane at the locations identified by the markers, and the objects used as markers are removed.
- 9.7.7 VacuSeal Roof Vents are located over the intersection of distribution pathways at the openings cut in the membrane. A skirt on the VacuSeal Roof Vent is welded or adhered with pressure sensitive butyl adhesive, to the roofing membrane.

10 Substantiating Data

- 10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
 - 10.1.1 Full-scale building testing at the Institute for Business and Home Safety (IBHS) Research Center
 - 10.1.2 Uplift resistance testing in accordance with UL 1897
 - 10.1.3 Full-scale wind tunnel testing at NASA Langley Research Center
 - 10.1.4 Wind tunnel testing at Virginia Tech
- 10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or RDPs. Accuracy of external test data and resulting analysis is relied upon.
- 10.3 Where pertinent, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.
- 10.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, or Duly Authenticated Reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this Duly Authenticated Report, may be dependent upon published design properties by others.
- 10.5 Testing and engineering analysis: The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.³¹
- 10.6 Where additional condition of use and/or regulatory compliance information is required, please search for VacuSeal Roof Vent on the DrJ Certification website.



11 Findings

- 11.1 As outlined in **Section 6**, VacuSeal Roof Vent has performance characteristics that were tested and/or meet applicable regulations and is suitable for use pursuant to its specified purpose.
- 11.2 When used and installed in accordance with this Duly Authenticated Report and the manufacturer installation instructions, VacuSeal Roof Vent shall be approved for the following applications:
- 11.2.1 Data and engineering analysis review has found that the VacuSeal Roof Vent, as described in this report, conforms to the requirements of the code references listed in **Section 4**.
- 11.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Carlisle SynTec Systems.
- 11.4 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10³² are similar) in pertinent part states:
- 104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.
- 11.5 **Approved:**³³ Building regulations require that the building official shall accept Duly Authenticated Reports.³⁴
- 11.5.1 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited.
- 11.5.2 An approved source is “approved” when an RDP is properly licensed to transact engineering commerce.
- 11.5.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.
- 11.6 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.
- 11.7 Through the IAF Multilateral Agreements (MLA), this Duly Authenticated Report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 Duly Authenticated Reports are equivalent.³⁵

12 Conditions of Use

- 12.1 Material properties shall not fall outside the boundaries defined in **Section 6**.
- 12.2 As defined in **Section 6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.
- 12.3 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
- 12.3.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.
- 12.3.2 This report and the installation instructions shall be submitted at the time of permit application.
- 12.3.3 This innovative product has an internal quality control program and a third-party quality assurance program.
- 12.3.4 At a minimum, this innovative product shall be installed per **Section 9** of this report.
- 12.3.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.



- 12.3.6 This innovative product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4, and IRC Section R109.2.
- 12.3.7 The application of this innovative product in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.
- 12.4 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, “*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.11,*” all of IBC Section 104, and IBC Section 105.4.
- 12.5 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).
- 12.6 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

13 Identification

- 13.1 The innovative product listed in **Section 1.1** is identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number and other information to confirm code compliance.
- 13.2 Additional technical information can be found at www.carlislesyntec.com.

14 Review Schedule

- 14.1 This report is subject to periodic review and revision. For the latest version, visit drjcertification.org.
- 14.2 For information on the status of this report, please contact [DrJ Certification](#).

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

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



Appendix A

1 Legislation that Authorizes AHJ Approval

- 1.1 **Fair Competition:** State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:
 - 1.1.1 Advance innovation
 - 1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints
 - 1.1.3 Benefit consumers through lower prices, better quality, and greater choice
- 1.2 **Adopted Legislation:** The following local, state, and federal regulations affirmatively authorize this innovative product to be approved by AHJs, delegates of building departments, and/or delegates of an agency of the federal government:
 - 1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies, and/or methods of construction. The goal is to “*protect economic freedom and opportunity by promoting free and fair competition in the marketplace.*”
 - 1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies, and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.
 - 1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),³⁶ where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years³⁷ and/or a \$5,000,000 fine or 3 times the value of³⁸ the Intellectual Property (IP) and Trade Secrets (TS).
 - 1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of Listings, certified reports, Technical Evaluation Reports, Duly Authenticated Reports, and/or research reports prepared by approved agencies and/or approved sources.
 - 1.2.4 For new materials³⁹ that are not specifically provided for in any regulation, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.
 - 1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.⁴⁰
 - 1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence provided in writing, that specific legislation have been violated by an individual registered PE.
 - 1.2.7 The AHJ shall accept Duly Authenticated Reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.⁴¹



- 1.3 **Approved⁴² by Los Angeles:** The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards that apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.⁴³ The Superintendent of Building Approved Testing Agency Roster is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a DrJ Listing are LAMC approved. In addition, the Superintendent of Building shall accept Duly Authenticated Reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.⁴⁴
- 1.4 **Approved by Chicago:** The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly, and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).
- 1.5 **Approved by New York City:** The 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed⁴⁵ an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement⁴⁶ (i.e., ANAB, International Accreditation Forum [IAF], etc.).
- 1.6 **Approved by Florida:** Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation by:
- 1.6.1 A certification mark or listing of an approved certification agency,
 - 1.6.2 A test report from an approved testing laboratory,
 - 1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or
 - 1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.
 - 1.6.5 For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods:
 - 1.6.5.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,
 - 1.6.5.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,
 - 1.6.5.3 A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code,



- 1.6.5.4 A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code, or
- 1.6.5.5 A statewide product approval issued by the Florida Building Commission.
- 1.6.6 The [Florida Department of Business and Professional Regulation \(DBPR\)](#) website provides a listing of companies certified as a [Product Evaluation Agency](#) (i.e., EVLMiami 13692), a [Product Certification Agency](#) (i.e., CER10642), and as a [Florida Registered Engineer](#) (i.e., ANE13741).
- 1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA]):** A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation [553.842](#) and [553.8425](#).
- 1.8 **Approved by New Jersey:** Pursuant to the 2018 Building Code of New Jersey in [IBC Section 1707.1 General](#),⁴⁷ it states: “*In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from [approved agencies](#) in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)*”.⁴⁸ Furthermore N.J.A.C 5:23-3.7 states: “*Municipal approvals of alternative materials, equipment, or methods of construction.*”
 - 1.8.1 **Approvals:** Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability, and safety of those conforming with the requirements of the regulations.
 - 1.8.1.1 A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of the above.
 - 1.8.1.2 Reports of engineering findings issued by nationally recognized evaluation service programs such as but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of the above.
 - 1.8.2 The [New Jersey Department of Community Affairs](#) has confirmed that technical evaluation reports, from any accredited entity listed by [ANAB](#), meets the requirements of item the previous paragraph, given that the listed entities are no longer in existence and/or do not provide “*reports of engineering findings.*”
- 1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards:** Pursuant to Title 24, Subtitle B, Chapter XX, [Part 3282.14](#)⁴⁹ and [Part 3280](#),⁵⁰ the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:
 - 1.9.1 “*All construction methods shall be in conformance with accepted engineering practices.*”
 - 1.9.2 “*The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.*”
 - 1.9.3 “*The design stresses of all materials shall conform to accepted engineering practice.*”









- 1.10 **Approval by US, Local and State Jurisdictions in General:** In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:
- 1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.⁵¹
 - 1.10.2 For innovative alternatives and/or methods of construction, the building official shall accept Duly Authenticated Reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.⁵²
 - 1.10.2.1 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is in the ANAB directory.
 - 1.10.2.2 An approved source is “approved” when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.⁵³
 - 1.10.3 The design strengths and permissible stresses of any structural material...shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.⁵⁴
- 1.11 **Approval by International Jurisdictions:** The USMCA and GATT agreements provide for approval of innovative materials, designs, services, and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:
- 1.11.1 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.
 - 1.11.2 **Approved:** The purpose of the MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA and subsequently, acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, designs, services, and/or methods of construction.
 - 1.11.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.⁵⁵
 - 1.11.4 Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.⁵⁶
- 1.12 Approval equity is a fundamental commercial and legal principle.⁵⁷

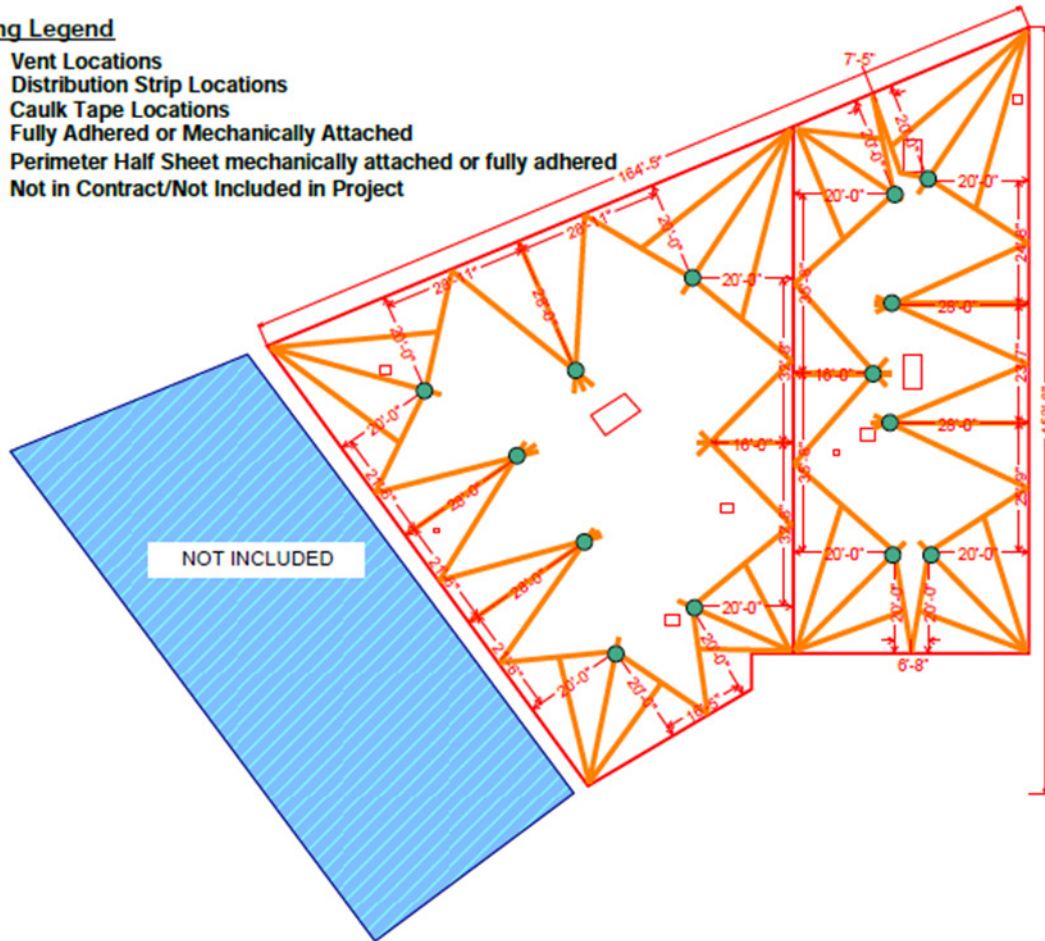


Appendix B. Example Design Layout

Roof Layout for VacuSeal Roof Vents:

Drawing Legend

-  Vent Locations
-  Distribution Strip Locations
-  Caulk Tape Locations
-  Fully Adhered or Mechanically Attached
-  Perimeter Half Sheet mechanically attached or fully adhered
-  Not in Contract/Not Included in Project





Issue Date: October 16, 2023
Subject to Renewal: July 1, 2025

FBC Supplement to Report Number 1401-02

REPORT HOLDER: Carlisle SynTec Systems

1 Evaluation Subject

1.1 VacuSeal Roof Vent

2 Purpose and Scope

2.1 Purpose

2.1.1 The purpose of this Report Supplement is to show VacuSeal Roof Vent, recognized in Report Number 1401-02, has also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.

2.2 *Applicable Code Editions:*

2.2.1 *FBC-B—20, 23: Florida Building Code – Building (FL 42724)*

2.2.2 *FBC-R—20, 23: Florida Building Code – Residential (FL 42724)*

3 Conclusions

3.1 VacuSeal Roof Vent, described in Report Number 1401-02, complies with the FBC-B and FBC-R and is subject to the conditions of use described in this supplement.

3.2 Where there are variations between the IBC and IRC and the FBC-B and FBC-R applicable to this report, they are listed here:

3.2.1 FBC-B Section 104.4 and Section 110.4 are reserved.

3.2.2 FBC-R Section R104 and Section R109 are reserved.

3.2.3 FBC-B Section 1503.2 replaces IBC Section 1503.2.

3.2.4 FBC-B Section 1504.5 replaces IBC Section 1504.6.

3.2.5 FBC-B Section 1504.3 replaces IBC Section 1504.4.

3.2.6 FBC-B Section 1504.4 replaces IBC Section 1504.4.1.

4 Conditions of Use

4.1 VacuSeal Roof Vent, described in Report Number 1401-02, must comply with all of the following conditions:

4.1.1 All applicable sections in Report Number 1401-02.

4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.



Notes

- 1 For more information, visit drjcertification.org or call us at 608-310-6748.
- 2 [2018 IBC Section 1504.5](#)
- 3 <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702>
- 4 Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review <https://www.justice.gov/atr/mission> and <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11>
- 5 <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706>:-:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as
- 6 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706>:-:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice
- 7 <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707>:-:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies
- 8 <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2>
- 9 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency
- 10 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source
- 11 <https://www.law.cornell.edu/uscode/text/18/1832> (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of \$5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: [Intellectual Property and Trade Secrets](#).
- 12 <https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional> AND <https://apassociation.org/list-of-engineering-boards-in-each-state-archive/>
- 13 <https://www.cbiteest.com/accreditation/>
- 14 <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104>:-:text=to%20enforce%20the%20provisions%20of%20this%20code
- 15 <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11>:-:text=Where%20the%20alternative%20material%20design%20or%20method%20of%20construction%20is%20not%20approved%20the%20building%20official%20shall%20respond%20in%20writing%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1>:-:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%20stating%20the%20reasons%20therefore
- 16 <https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707>:-:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11
- 17 <https://iaf.nu/en/about-iaf>:-:text=it%20is%20required%20to%20recognize%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%20with%20the%20appropriate%20scope
- 18 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- 19 <https://www.justice.gov/crt/deprivation-rights-under-color-law> AND <https://www.justice.gov/atr/mission>
- 20 Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.
- 21 All references to the FBC-B and FBC-R are the same as the 2021 IBC and 2021 IRC unless otherwise noted in the Florida Supplement at the end of this report.
- 22 <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2>(Listed%20or%20certified); <https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled>
- 23 [2018 IBC Section 1504.3.1](#)
- 24 [2018 IBC Section 1504.3](#)
- 25 [2018 IBC Section 1511.3.1.1](#)
- 26 [2018 IBC Section 1511.2](#)
- 27 <https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4>
- 28 <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#>:-:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%20livable%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades
- 29 <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#>:-:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur
- 30 Qualification is performed by a legislatively defined Accreditation Body. ANAB National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. [DrJ](#) is an ANAB accredited [product certification body](#).



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

32 2018 IFC Section 104.9

33 Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

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

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

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

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

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

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

40 IBC 2021, Section 1706.1 Conformance to Standards

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

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

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

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

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

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

47 <https://up.codes/viewer/new-jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1>

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

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

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

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

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

53 <https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional> AND <https://apassociation.org/list-of-engineering-boards-in-each-state-archive/>

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

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

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

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