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Technical Evaluation Report™

TER 1401-02

Carlisle SynTec Systems VacuSeal™ Vent System

Carlisle SynTec Systems

Product:

VacuSeal™ Roof Vent

Issue Date:

August 13, 2018

Revision Date:

December 5, 2023

Subject to Renewal:

July 1, 2027

KIRK H. GRUNDAHL LICENSE No 73618 STATE OF FLORIDA PROFESSIONAL ENGINEER

12/05/2023

Kirk Grundahl Digitally signed by Kirk Grundahl Date: 2023.12.05 08:26:01 -06'00'

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COMPANY INFORMATION:	ADDITIONAL LISTEES:
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DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION	
SECTION: 07 05 00 - Membrane Roofing	SECTION: 07 07 00 - Roof Accessories

1 Innovative Product Evaluated[1,2]

1.1 VacuSeal™ Roof Vent

2 Applicable Codes and Standards[3,4]

2.1 *Codes*

2.1.1 *IBC—15, 18, 21: International Building Code®*

2.1.2 *IRC—15, 18, 21: International Residential Code®*

2.1.3 *FBC-B—20, 23: Florida Building Code – Building (FL 42724)*[5]

2.1.4 *FBC-R—20, 23: Florida Building Code – Residential (FL 42724)*[5]

2.2 *Standards and Referenced Documents*

2.2.1 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*

2.2.2 *UL 1897: Uplift Tests for Roof Covering Systems*

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

2 **Federal Regulation Definition.** 24 CFR 3280.2 "Listed or certified" means included in a list published by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection 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. **International Building Code (IBC) Definition of Listed.** Equipment, materials, products or services included in a list published by an organization acceptable to the building official and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose Listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. **IBC Definition of Labeled**. Equipment, materials or products to which has been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, approved agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

3 This Listing is a code defined research report, which is also known as a duly authenticated report, provided by an approved agency (see IBC Section 1703.1) and/or an approved source (see IBC Section 1703.4.2). An approved agency is "approved" when it is ANAB accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory). A professional engineer is "approved" as an approved source when that professional engineer is properly licensed to transact engineering commerce. Where sealed by a professional engineer, it is also a duly authenticated report certified by an approved source. (i.e., Registered Design Professional). DrJ is an ANAB accredited product certification body.

4 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.

5 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 TER.

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3 Performance Evaluation

3.1 Tests, test reports, research reports, duly authenticated reports and related engineering evaluations are defined as intellectual property and/or trade secrets and protected by Defend Trade Secrets Act 2016 (DTSA).[6]

3.2 Testing and/or inspections conducted for this TER were performed an ISO/IEC 17025 accredited testing laboratory,[7] an ISO/IEC 17020 accredited inspection body,[8] which are internationally recognized accreditations through International Accreditation Forum (IAF), and/or a licensed Registered Design Professional (RDP).

3.3 This TER examines the ability of the VacuSeal™ roof vent to resist wind uplift forces for the following conditions:

3.3.1 Performance of VacuSeal™ Roof Vents used with single-ply roof membranes installed on low-slope roofs.

3.4 Any building code 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 qualified[9] to practice product and code compliance services within its scope of accreditation and engineering expertise, respectively.

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

3.6 Any regulation specific issues not addressed in this section are outside the scope of this TER.

4 Product Description and Materials

4.1 The innovative product evaluated in this TER is shown in Figure 1.

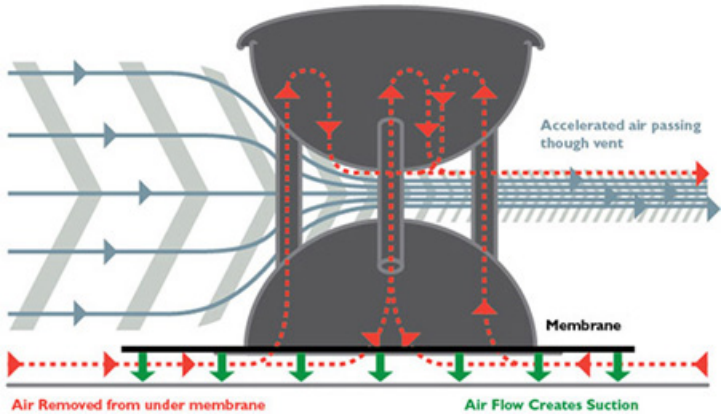

Figure 1. Schematic of VacuSeal™ Roof Vent Operation

[6] https://www.law.cornell.edu/uscode/text/18/part-I/chapter-90. Given our professional duty to inform, please be aware that whoever, with intent to convert a trade secret (TS), that is related to a product or service used in or intended for use in interstate or foreign commerce, to the economic benefit of anyone other than the owner thereof, and intending or knowing that the offense will, injure any owner of that trade secret, knowingly without authorization copies, duplicates, sketches, draws, photographs, downloads, uploads, alters, destroys, photocopies, replicates, transmits, delivers, sends, mails, communicates, or conveys such information; shall be fined under this title or imprisoned not more than 10 years, or both. 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. As the National Society of Professional Engineers states, "Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve." Therefore, to protect intellectual property (IP) and TS, and to achieve 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. For more information, please review this website: Intellectual Property and Trade Secrets.

[7] Internationally recognized accreditations are performed by members of the International Accreditation Forum (IAF). Accreditation Body and Regional Accreditation Group Members of IAF are admitted to the IAF MLA only after a stringent evaluation of their operations by a peer evaluation team, which is charged to ensure that the applicant complies fully with both international standards and IAF requirements. Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope.

[8] Ibid.

[9] Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

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4.2 *VacuSeal™ Roof Vent System Description*

4.2.1 VacuSeal™ Roof Vent is a roof anchoring system for single-ply roof membranes.

4.2.2 VacuSeal™ Roof Vent is a patented technology under U.S. Patent Nos. 7,001,266 and 7,607,974.

4.2.3 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.

4.2.4 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.

4.2.4.1 The Bernoulli Principle states that an increase in the speed of a fluid (air) causes a decrease in the fluid pressure.

4.2.4.2 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.

4.2.5 VacuSeal™ Roof Vent consists of two hollow, hemispherical domes separated by a gap, as shown in Figure 2.

4.2.6 As the wind blows through the narrow gap, it accelerates which lowers the pressure and creates suction.

4.2.7 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.

4.2.8 Distribution strips are placed immediately beneath the roofing membrane to allow airflow to the VacuSeal™ Roof Vents. 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).

4.2.9 VacuSeal™ Roof Vents are placed over the intersection of distribution pathways at openings cut in the membrane (Figure 2).

4.2.10 The lower hemisphere of the VacuSeal™ Roof Vent has a flange for attaching the roof membrane to the vent (see Figure 2).

4.2.11 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).

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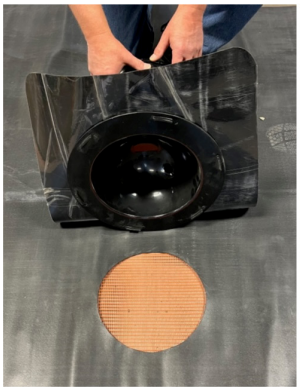
Distribution Strips Connect the Roof Perimeter to the VacuSeal™ roof vents

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

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4.3 *Materials*

4.3.1 *VacuSeal™ Roof Vents:*

4.3.1.1 VacuSeal™ Roof Vents are manufactured from UV-resistant PVC.

4.3.2 *Distribution Strips:*

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

4.3.3 *Roofing Membrane:*

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

4.3.4 *Termination Bar:*

4.3.4.1 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.[10]

5 Applications

5.1 *General*

5.1.1 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.[11]

5.1.2 VacuSeal™ Roof Vent system is used as an alternative attachment method to a mechanically attached or fully adhered roof membrane.

5.1.3 VacuSeal™ Roof Vent can also be used for recovering existing roof or as a reroofing application in accordance with Section 5.2.

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

5.1.5 *Design:*

5.1.5.1 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 5.1.5.2.

5.1.5.2 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.

5.1.5.3 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 5.1.7.

[10] 2018 IBC Section 1504.5

[11] 2018 IBC Section 1504.3.1

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5.1.5.4 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.

5.1.5.4.1 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.

5.1.5.4.2 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.

5.1.5.4.3 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 5.1.7 multiplied by the area of the field, perimeter, and corners of the roof, respectively.

5.1.6 The layout of the VacuSeal™ Roof Vents must meet the following minimum requirements.

5.1.6.1 The first row of VacuSeal™ Roof Vents around the perimeter of the roof shall be staggered.

5.1.6.2 The first row of VacuSeal™ Roof Vents from the perimeter edge shall be located, at a minimum, in accordance with the following:

5.1.6.2.1 Table 2 for roofs with a 10,000 ft^2 area

5.1.6.2.2 Table 3 for roofs with a 25,000 ft^2 area

5.1.6.2.3 Table 4 for roofs with a 50,000 ft^2 area

5.1.6.2.4 Table 5 for roofs with a 100,000 ft^2 area

5.1.6.2.5 For roofs over 100,000 ft^2 and/or greater than 150 ft in height, the minimum placement distance from the parapet wall to the vent is 9'.

5.1.6.2.6 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 ft^2 roof, use 25,000 ft^2).

5.1.6.2.7 “Max” values listed in the following tables represent the distance from the roof perimeter where the wind velocity approaches a maximum speed.

5.1.6.3 See Figure 3 for an example of VacuSeal™ Roof Vent layout.

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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 Ft^2 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

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

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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 Ft^2 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

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'.

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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 Ft^2 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

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'.

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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 Ft^2 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'.

5.1.6.4 The maximum spacing between the VacuSeal™ Roof Vents along the perimeter of the roof is 50' o.c (see Figure 3).

5.1.6.5 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.

5.1.6.5.1 The maximum spacing between the VacuSeal™ roof vents in the second row is 125' o.c.

5.1.6.6 The dimensions of the roof shall be sufficient to allow a minimum of two (2) VacuSeal™ Roof Vents to be placed along each side.

5.1.6.7 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.

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5.1.7 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 1504.4[12] and IBC Section 1609.5.

5.1.7.1 The roof membrane shall be designed to resist the design wind load pressures for components and cladding in accordance with ASCE 7 Chapter 30.

5.1.7.2 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.

5.1.7.2.1 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.

5.1.7.3 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.

5.1.7.3.1 For roofs designed in accordance with the recommendations of FM LPDS 1-28, the wind pressures shall be based on a maximum 10 ft^2 effective wind area, regardless of the actual effective area of the roof membrane.

5.1.8 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.

5.2 *Roof Recovering*

5.2.1 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.[13]

5.2.1.1 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.

5.2.1.2 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.

5.2.2 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:

5.2.2.1 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.[14]

5.2.2.2 The existing roof deck and structural components shall also be capable of supporting the additional loads due to the construction activities.

5.2.2.3 The existing roof covering shall not be wood shake, slate, clay, cement, or asbestos-cement tile.

5.3 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.

[12] 2018 IBC Section 1504.3

[13] 2018 IBC Section 1511.3.1.1

[14] 2018 IBC Section 1511.2

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6 Installation

6.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this TER, and the applicable building code.

6.2 A copy of the published manufacturer installation instructions shall be available at all times on the jobsite during installation.

6.3 All contractors using the VacuSeal™ Roof Vent system must be certified by Carlisle SynTec Systems.

6.4 Installation of the roofing membrane shall be in accordance with the roofing membrane manufacturer specifications and the approved Construction Documents.

6.5 The roof shall have flashing installed in accordance with IBC Section 1503.2 and the flashing manufacturer installation instructions.

6.6 *Installation Procedure*

6.6.1 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.

6.6.1.1 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.

6.6.1.2 Openings in the deck shall be air sealed with appropriate materials to achieve the intended purpose.

6.6.2 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.

6.6.3 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.

6.6.3.1 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.

6.6.3.2 See Figure 3 for an example of the distribution strip layout for the perimeter VacuSeal™ roof vents.

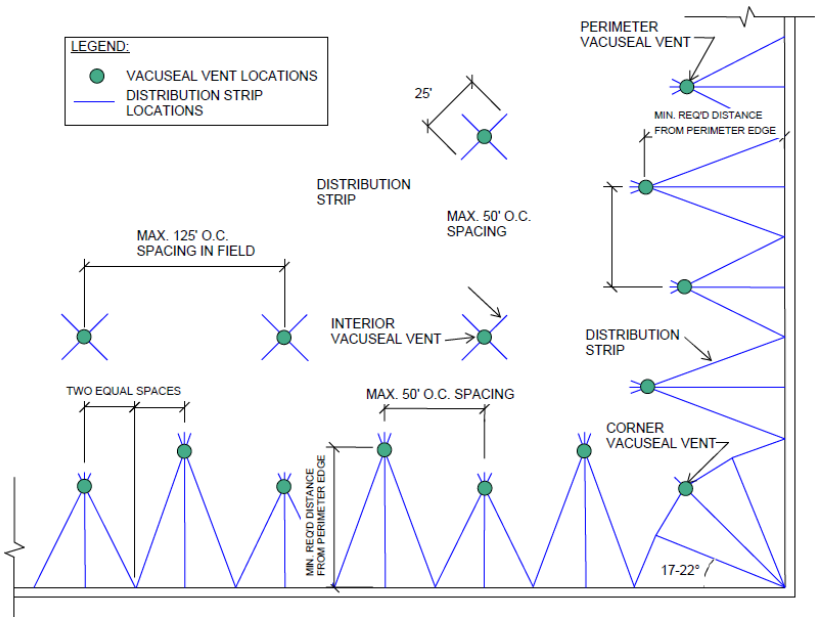

Figure 3. Distribution Strip Layout for VacuSeal™ Roof Vents

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6.6.3.3 At re-entrant roof corners, three (3) distribution strips shall radiate from the corner.

6.6.3.3.1 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.

6.6.3.3.1.1 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.

6.6.3.4 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.

6.6.3.5 The distribution strips shall be routed around any openings/obstructions in its path.

6.6.4 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.

6.6.5 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.

6.6.6 A 10" diameter opening is cut in the membrane at the locations identified by the markers, and the objects used as markers are removed.

6.6.7 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.

6.7 In the event of a conflict between the manufacturer installation instructions and this TER, the more restrictive shall govern.

7 Substantiating Data

7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

7.1.1 Full-scale building testing at the Institute for Business and Home Safety (IBHS) Research Center

7.1.2 Uplift resistance testing in accordance with UL 1897

7.1.3 Full-scale wind tunnel testing at NASA Langley Research Center

7.1.4 Wind tunnel testing at Virginia Tech

7.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies (i.e., ANAB accredited agencies), approved sources (i.e., RDPs), and/or professional engineering regulations. Accuracy of external test data and resulting analysis is relied upon.

7.3 Where pertinent, testing and/or engineering analysis is based upon provisions that have been codified into law through state or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published content. DrJ’s engineering practice may use a code-adopted provision as the control sample. A control sample versus a test sample establishes a product as being equivalent to the code-adopted provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

7.4 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, Listings, certified reports, duly authenticated reports from approved agencies, and research reports prepared by approved agencies and/or approved sources provided by the suppliers of products, materials, designs, assemblies, and/or methods of construction. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ’s engineering practice, as contained in this TER, may be dependent upon published design properties by others.

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7.5 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.[15]

7.6 Where additional condition of use and/or code compliance information is required, please search for VacuSeal™ Roof Vent on the DrJ Certification website.

8 Findings

8.1 As delineated in Section 3, VacuSeal™ Roof Vent has performance characteristics that were tested and/or meet applicable standards and is suitable for use pursuant to its specified purpose.

8.2 When used and installed in accordance with this TER and the manufacturer installation instructions, VacuSeal™ Roof Vent shall be approved for the following applications:

8.2.1 Data and engineering analysis review has found that the VacuSeal™ Roof Vent, as described in this TER, conforms to the requirements of the code references listed in Section 2.

8.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Carlisle SynTec Systems.

8.4 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[16] 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.

8.5 **Approved**:[17] Building codes require that the building official shall accept duly authenticated reports[18] or research reports[19] from approved agencies and/or approved sources (i.e., licensed RDP) with respect to the quality and manner of use of new products, materials, designs, services, assemblies, or methods of construction.

8.5.1 Acceptance of an approved agency, by a building official, is performed by verifying that the agency is accredited by a recognized accreditation body of the International Accreditation Forum (IAF).

8.5.2 Acceptance of a licensed RDP, by a building official, is performed by verifying that the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.

8.5.3 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, as denial without written reason deprives a protected right to free and fair competition in the marketplace.

8.6 DrJ is an engineering company, employs RDPs and is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131.

8.7 Through ANAB accreditation and the IAF Multilateral Agreements, this TER can be used to obtain product approval in any jurisdiction or country that has IAF MLA Members and Signatories to meet the Purpose of the MLA – "*certified once, accepted everywhere*." IAF specifically says, "*Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope*."[20]

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

[16] 2018 IFC Section 104.9

[17] 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.

[18] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1

[19] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2

[20] https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise

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9 Conditions of Use

9.1 Material properties shall not fall outside the boundaries defined in Section 3.

9.2 As defined in Section 3, 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.

9.3 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:

9.3.1 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.

9.3.2 This TER and the installation instructions shall be submitted at the time of permit application.

9.3.3 This innovative product has an internal quality control program and a third-party quality assurance program.

9.3.4 At a minimum, this innovative product shall be installed per Section 6 of this TER.

9.3.5 The review of this TER, by the AHJ, shall be in compliance with IBC Section 104 and IBC Section 105.4.

9.3.6 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.

9.3.7 The application of this innovative product in the context of this TER 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.

9.4 The approval of this TER by the AHJ shall comply with IBC Section 1707.1, where legislation states in pertinent part, "*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.11*", all of IBC Section 104, and IBC Section 105.4.

9.5 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 (i.e., owner or RDP).

9.6 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.

10 Identification

10.1 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, TER number, and other information to confirm code compliance.

10.2 Additional technical information can be found at www.carlislesyntec.com.

11 Review Schedule

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

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

12 Approved for Use Pursuant to US and International Legislation Defined in Appendix A

12.1 VacuSeal™ Roof Vent is included in this TER 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, and whose TER Listing states either that the material, product, or service meets identified standards or has been tested and found suitable for a specified purpose. This TER meets the legislative intent and definition of being acceptable to the AHJ.

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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, and

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 VacuSeal™ Roof Vent 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),[21] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than 10 years[22] and/or a $5,000,000 fine or 3 times the value of[23] 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 materials[24] that are not specifically provided for in any building code, 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.[25]

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 has 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.[26]

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[21] http://www.drjengineering.org/AppendixC and https://www.drjcertification.org/cornell-2016-protection-trade-secrets.

[22] https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years

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

[24] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2

[25] IBC 2021, Section 1706.1 Conformance to Standards

[26] IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

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1.3 **Approved**[27] **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, which 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.[28] The Superintendent of Building roster of approved testing agencies 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 CBI 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.[29]

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 NYC Building Code 2022 (NYCBC) states in pertinent part that an approved agency shall be deemed[30] 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 agreement[31] (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) A certification mark or listing of an approved certification agency, 2) A test report from an approved testing laboratory, 3) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity; 4) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a professional engineer or architect, licensed in Florida. 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) A certification mark, listing, or label from a commission-approved certification agency indicating that the product complies with the code; 2) A test report from a commission-approved testing laboratory indicating that the product tested complies with the code; 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; 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; 5) A statewide product approval issued by the Florida Building Commission. 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).

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[27] See Section 8 for the distilled building code definition of **Approved**

[28] Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

[29] https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

[30] New York City, The Rules of the City of New York, § 101-07 Approved Agencies

[31] New York City, The Rules of the City of New York, § 101-07 Approved Agencies

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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 Building Code 2018 of New Jersey in IBC Section 1707.1 General,[32] 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)".[33] Furthermore N.J.A.C 5:23-3.7 states: Municipal approvals of alternative materials, equipment, or methods of construction. **(a) 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. 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 (a) above. 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 (a) above. 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 2 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[34] and Part 3280,[35] the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform with the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow: 1) "All construction methods shall be in conformance with accepted engineering practices"; 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."; and 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.[36]

1.10.2 For innovative alternative products, materials, designs, services and/or methods of construction, in the absence of approved rules or other approved standards…the building official shall accept duly authenticated reports (i.e., listing and/or research report) from approved agencies with respect to the quality and manner of use of new materials or assemblies.[37] A building official approved agency is deemed to be approved via certification from an accreditation body that is listed by the International Accreditation Forum[38] or equivalent.

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[32] https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

[33] https://www.nj.gov/dca/divisions/codes/codreg/ucc.html

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

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

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

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

[38] Please see the ANAB directory for building official approved agencies.

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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.[39] An approved source is defined as a PE subject to professional engineering laws, where a research and/or a technical evaluation report certified by a PE, shall be approved.

1.11 **Approval by International Jurisdictions**: The USMCA and GATT agreements provide for approval of innovative materials, products, designs, services, assemblies and/or methods of construction through the Technical Barriers to Trade agreements and the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA), where these agreements:

1.11.1 Permit participation of conformity assessment bodies located in the territories of other Members (defined as GATT Countries) under conditions no less favourable than those accorded to bodies located within their territory or the territory of any other country,

1.11.2 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.

1.11.3 State that conformity assessment procedures are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means that conformity assessment procedures shall not be more strict or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform to the applicable technical regulations or standards.

1.11.4 **Approved**: The purpose of the IAF 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, products, designs, services, assemblies and/or methods of construction. Accreditations granted by IAF MLA signatories are recognised worldwide based on their equivalent accreditation programs, therefore reducing costs and adding value to businesses and consumers.

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

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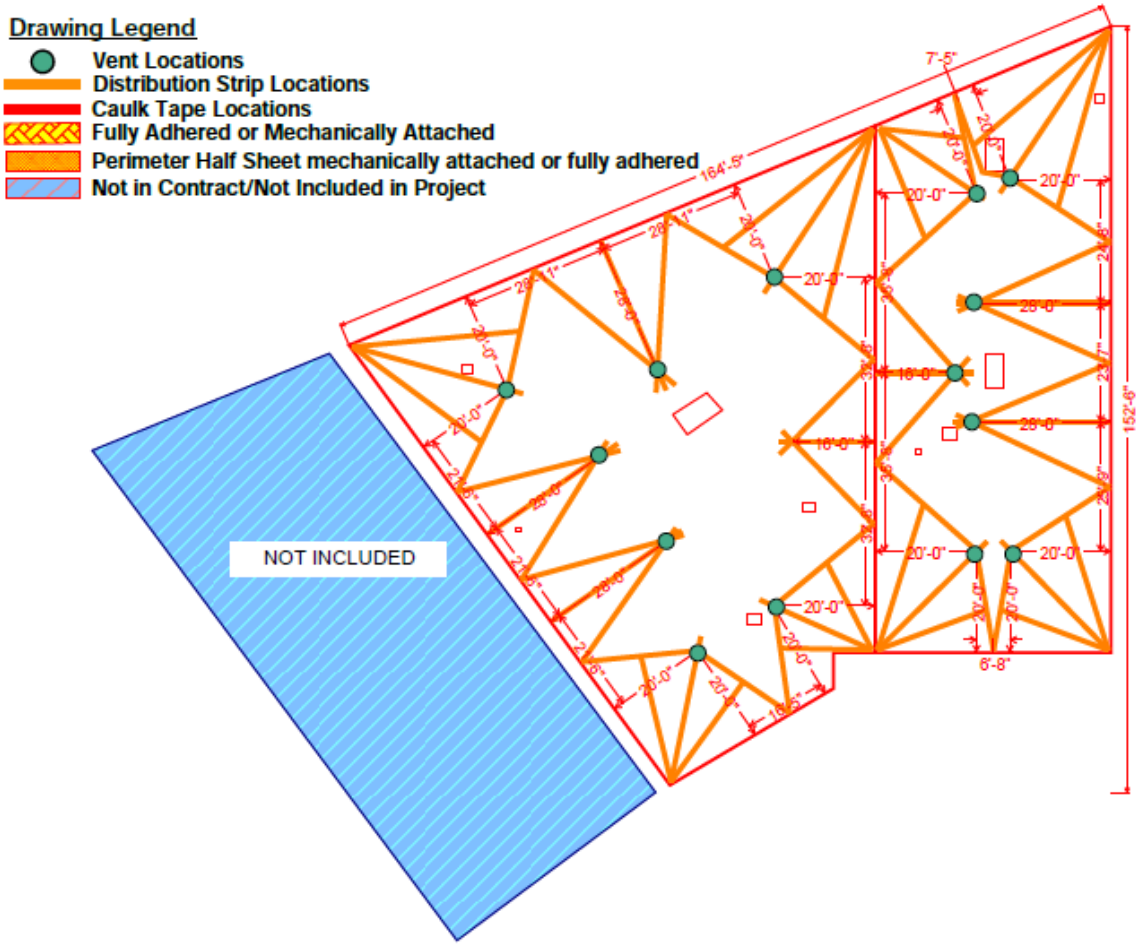
Appendix B. Example Design Layout

Roof Layout for VacuSeal™ Roof Vents:



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Issue Date: October 16, 2023

Subject to Renewal: July 1, 2027

FBC Supplement to TER 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 Technical Evaluation Report (TER) supplement is to show VacuSeal™ Roof Vent, recognized in TER 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 TER 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 TER, 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 TER 1401-02, must comply with all of the following conditions:

4.1.1 All applicable sections in TER 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.

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