Listing and Technical Evaluation Report™

Report No: 1906-01

Issue Date: April 3, 2020

Revision Date: June 11, 2024

Subject to Renewal: July 1, 2025

Quadravent® as a Component of Wind Ballasted Securement Systems for Single-Ply Membrane Roofs

Trade Secret Report Holder:

Qorbo Enterprises, LLC

Phone: 833-276-7263 Website: www.qorboenterprises.com Email: info@qorboenterprises.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 Evaluated[1]

1.1 Quadravent®

2 Product Description and Materials

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

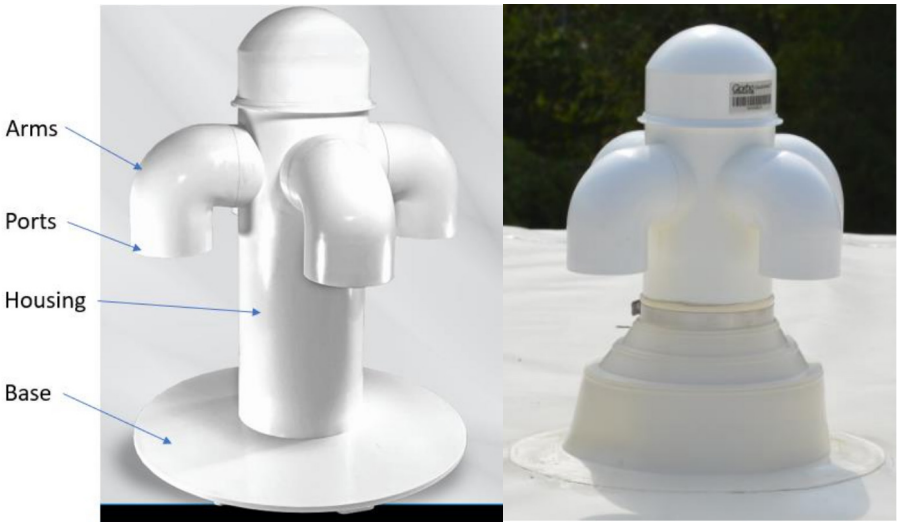

Figure 1. Quadravent Before (Left) and After (Right) Installation

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

2.2 *Quadravent Roof Vent System Description*

2.2.1 Dimensions of the Quadravent are shown in **Figure 2**.

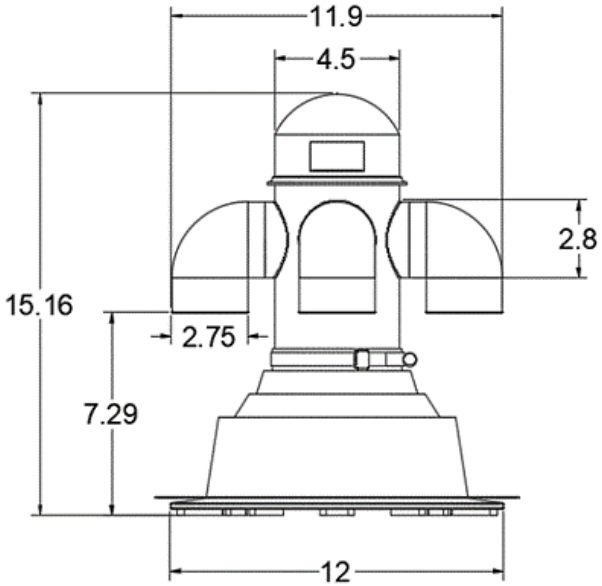

Figure 2. Dimensions of Quadravent Post-Installation

2.2.2 Quadravent is a bi-modal roof vent for use on loose-laid, single-ply roof membrane systems on low slope ("flat") roofs to keep the roof membrane in place during low-pressure weather events. The term bimodal means the Quadravent can be placed in both a low wind velocity, low air pressure zone, as well as a high wind velocity, low air pressure zone.

2.2.3 When turbulent wind passes the Quadravent, a low air pressure zone is created at its ports. This low air pressure zone creates a vacuum effect and is communicated from the ports, through the housing, to the base of the Quadravent, which is welded, and thus air-sealed, to the membrane. The stronger the wind, the lower the air pressure created. See **Figure 3** for an illustration.

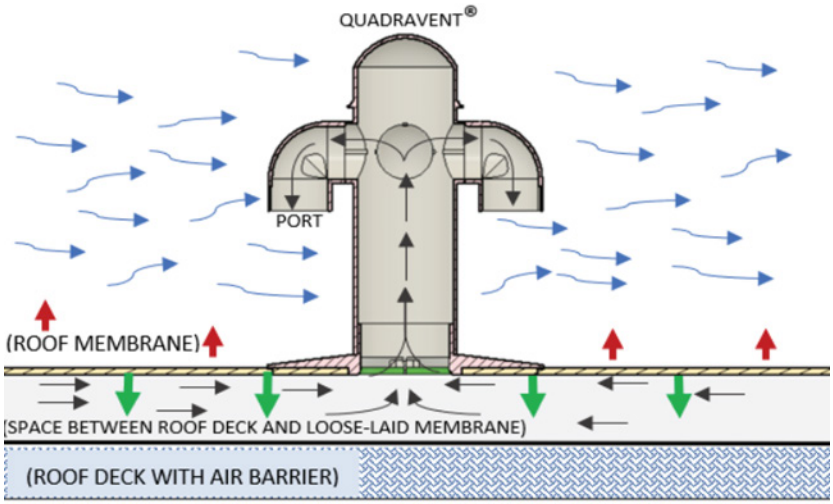

Figure 3. Quadravent - Air Flow Diagram

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

2.2.4 Air distribution strips, called “scrim”, are placed on the roof layer just beneath the roof membrane to allow airflow under the membrane and between each Quadravent. See **Section 9** for installation details.

2.2.5 The underlying substrate layer and the roof membrane layer are air-sealed to each other to create an air-sealed space between the underlying substrate and the membrane. The low air pressure created by each Quadravent will evacuate air from between the membrane and the underlying substrate, which lowers the pressure under the membrane across the roof and pulls the membrane down against the layers below it, thereby protecting the roof against wind.

2.2.6 The Quadravent roof system replaces ballasted, adhered or mechanically attached methods of securing the roof membrane to the roof deck.

2.3 *Materials*

2.3.1 *Quadravent: Made from UV-Stable PVC:*

2.3.1.1 *Air Distribution Strips (Scrim):*

2.3.1.1.1 Air permeable filter fabric (loose laid) approved by Qorbo Enterprises, LLC.

2.3.1.1.2 Scrim is a thin polyethylene mesh material that has thin strands of plastic laid out in a grid with widthwise strands on top and lengthwise strands on bottom.

2.3.1.2 *Roof Membrane:*

2.3.1.2.1 Ketone Ethylene Ester (KEE) based sheet-roofing membrane meeting ASTM D6754 or equivalent approved by Qorbo Enterprises, LLC.

2.3.1.2.2 Other modified bitumen roofing or single-ply roof membrane products can be used if they meet the material standards and installation requirements of IBC Section 1507.11 or IBC Section 1507.12,[2] respectively.

2.3.1.3 *Air Sealing:*

2.3.1.3.1 Bitumen, modified bitumen, built up roof, commercial air and vapor barriers, vapor barrier adhesive sheets or other materials approved by Qorbo Enterprises, LLC.

2.3.1.3.2 All termination points of both the underlying substrate layer and the membrane layer must be air sealed at the membrane layer and at the underlying substrate layer. See **Section 9** for further details.

2.3.1.4 *Edge Securement:*

2.3.1.4.1 Edge metal meeting the requirements of ES 1, as required by the authority having jurisdiction or equivalent.

2.3.1.4.2 Roof edge must be air sealed using techniques shown in the manufacturer installation instructions or Qorbo-accepted shop drawings.

2.3.1.4.3 The edge securement method used for securing the edges of the roof membrane shall meet the requirements of IBC Section 1504.6.[3]

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

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

3 Definitions

3.1 New Materials[4] 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.[5] The design strengths and permissible stresses shall be established by tests[6] and/or engineering analysis.[7]

3.2 Duly Authenticated Reports[8] and Research Reports[9] are test reports and related engineering evaluations, which are written by an approved agency[10] and/or an approved source.[11]

3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).[12]

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.[13]

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 ANAB[14] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[15] 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 writing[16] 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.[17]

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.[18] Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.[19]

3.9 Approval equity is a fundamental commercial and legal principle.[20]

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation[21]

4.1 *Standards*

4.1.1 *ASCI/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*

4.1.2 *FM 4474: American National Standard for Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures*

4.1.3 *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 *FBC-B—20, 23: Florida Building Code – Building[22] (FL #41888)*

4.2.4 *FBC-R—20, 23: Florida Building Code – Residential[22] (FL #41888)*

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

5 Listed[23]

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 Quadravent is used as a hold-down device to resist wind uplift forces on single-ply and modified bitumen membrane systems in accordance with IBC Section 1504.4.1.[24]

6.2 *Design*

6.2.1 The Quadravent roof system shall be designed on a per roof basis in accordance with ASCE 7 to meet the wind pressure requirements and/or designed by the building designer (i.e., owner or registered design professional).

6.2.2 The ultimate uplift resistance for the Quadravent is given in **Table 1**.

Table 1. Uplift Resistance for the Quadravent[3,4]

Product	Ultimate Wind Uplift Resistance[1,2] (psf)
Quadravent	345

SI: 1 psf = 0.0479 kN/m^2

1. Tested in accordance with UL 1897
2. Building designer shall apply appropriate factors of safety.
3. Design wind loads shall be in accordance with ASCE 7. Note: the basic wind speeds (V) used in ASCE 7 are ultimate design wind speeds (V_{ult}). If required, conversion to nominal design wind speed (V_{asd}) is specified in IBC Section 1609.3.1.
4. Perimeter enhancements are additive to the ultimate wind uplift resistance in accordance with Section 6.2.3.

6.2.3 The uplift resistance provided by the fastening method in the edge securement around the roof perimeter and at penetrations can be added to the uplift resistance of the Quadravent system given in **Table 1**.

6.2.4 Wind load pressures on the roof membrane that are to be resisted by the Quadravent system shall be determined in accordance with ASCE 7 per IBC Section 1504.4[25] and IBC Section 1609.5.

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

6.2.4.2 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.

6.2.4.2.1 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.

6.2.4.3 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.

6.2.4.3.1 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.

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

6.2.5 Quadravent vents are positioned according to a layout plan provided for each project.

6.2.5.1 The Vent Edge Distance (VED) (the distance between the vents closest to the roof edge and the outer edge of the roof) shall be no less than 5 ft. and no more than 20 ft.

6.2.5.2 For roofs with surface area greater than 500 ft^2, the number of vents per roof shall be greater than or equal to two.

6.2.5.3 The maximum grid spacing between the vents is 50 ft.

6.2.5.4 Quadravent that service corner zones shall be oriented with arm facing the apex of the corner as detailed in **Section 9**. Exceptions are allowed for special circumstances per specific designs.

6.2.5.5 Quadravent that do not service corner zones shall be oriented with arm facing the closest roof edge as detailed in **Section 9**. Exceptions are allowed for special circumstances per specific designs.

6.2.5.6 The design wind pressure of each roof zone as defined in ASCE 7 shall each be less than the nominal wind uplift resistance of the Quadravent.

6.2.5.7 See **Appendix B** for a calculation example for a roof height ≤ 60 ft.

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 Performance[26]

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.[27]

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.[28]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 Quadravent complies with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Quadravent was evaluated for use with modified bitumen and single-ply roof membranes installed on low slope roofs to resist wind uplift forces:

8.1.1.1 Wind load resistance for roof coverings in accordance with IBC Section 1504.1.

8.1.1.2 Resistance to wind loads on non-ballasted roofs in accordance with IBC Section 1504.4[29] and IBC Section 1504.4.1.[30]

8.1.2 The roof assembly design, materials and components, other than the Quadravent, are outside the scope of this report.

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 qualified[31] 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.

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

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 manufacturer published installation instructions shall be available at all times on the jobsite during installation.

9.4 Installation of the roofing membrane shall be in accordance with the roofing membrane manufacturer specifications and the approved construction documents.

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

9.6 The roof covering used in the roof assembly shall meet the requirements of IBC Section 1507.

9.7 *Installation Procedure*

9.7.1 *Documentation Review:*

9.7.1.1 Review the design documents for the specific roof.

9.7.1.2 Confirm the existing underlying substrate can support the loads from the roof system including the weight of all Quadravent vents and roof system materials during and after the construction process and the wind load requirements for the roof as determined by ASCE 7 per **Section 6.**2.4.

9.7.2 *Air Seal the Underlying Substrate:*

9.7.2.1 Assure the underlying substrate is adequately air-sealed prior to installing the new roof system. This includes the entire field and all termination points of the underlying substrate including roof edges, walls, penetrations, curbs, drains, scuppers, expansion joints, visible dividers and any unique termination points.

9.7.2.2 A floating membrane from an existing roof cannot be the primary air-seal for the underlying substrate.

9.7.3 *Roof Recovering:*

9.7.3.1 Quadravent single-ply membrane roof system can be installed over an existing roof, which serves as the underlying substrate, when the existing roof meets the following requirements:

9.7.3.1.1 The existing roof has an existing air barrier that provides an adequate air-seal across the entire roof and at every termination point, or can be made to have an adequate air-seal across the entire roof and at every termination point. Termination points include roof edges, walls, penetrations, curbs, drains, scuppers, expansion joints, visible dividers and any unique termination points not mentioned above.

9.7.3.1.2 The primary air-seal of the existing roof is not from a loose-laid membrane.

9.7.3.2 If the existing roof has a floating membrane and an air-sealed layer below the floating membrane, and the design calls for leaving the membrane in place, a hole at every Quadravent location equal to the diameter of the Quadravent base flange shall be cut to allow air under the existing membrane to escape.

9.7.4 *Insulate:*

9.7.4.1 If required, install the insulation and cover board layers. Place these layers on top of the air-sealed underlying substrate. These can be loose-laid or, if required, adhered to the underlying substrate.

9.7.4.2 Mechanical fasteners cannot be used to install insulation on top of the air-sealed underlying substrate.

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

9.7.5 *Install Air Distribution Strips (Scrim):*

9.7.5.1 Scrim is laid out on the roof layer just below the membrane, allowing air to travel along and across the scrim area while the membrane is resting on top of it.

9.7.5.2 Lay out the scrim to create the air distribution system per the design documentation. For each Quadravent location, there is a star scrim pattern; for each roof edge there is edge scrim. **Figure 4** shows a typical star scrim pattern. **Figure 5** shows a typical 200' x 400' rooftop including both star scrim patterns and edge scrim.

9.7.5.3 For each Quadravent location, lay out a pattern of scrim as shown on the design documentation. The scrim is laid out and oriented such that the widthwise strands are on top and the lengthwise strands are on the bottom as shown in Section A-A of **Figure 4**.

9.7.5.4 There is one scrim pattern per Quadravent. There are four scrim segments per pattern. Each segment is laid so that it intersects the other three segments at the Quadravent location. The length of each segment of the pattern is cut per the design documentation.

9.7.5.5 Tack scrim to the roofing surface over which it is being laid using 2" square tabs of Qorbo Butyl Tape. The roofing surface must be clear of debris and be a suitable surface as specified in the design documentation.

9.7.5.6 Lay out the roof edge scrim (**Figure 5**). Roof edge scrim is in addition to scrim patterns at each vent location. A length of scrim is placed parallel to and within 5' of each roof edge such that it intersects with one or more of the lengths of scrim from the scrim patterns of the line of Quadravent closest to the edge. The roof edge scrim is tacked per **Section 9.7.5.5**.

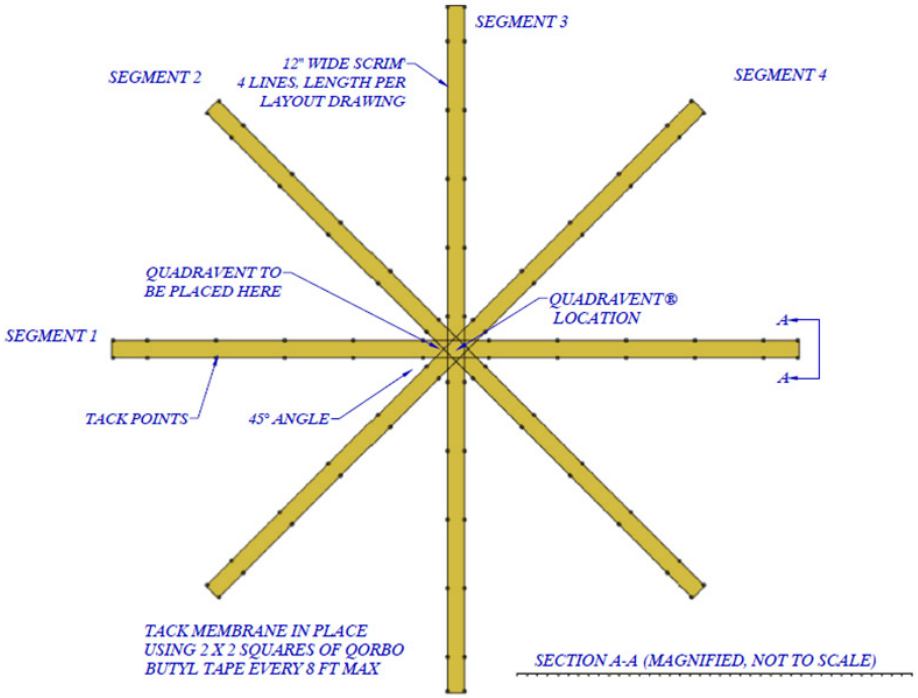

Figure 4. Scrim Layout and Cross Section Showing Proper Orientation of Scrim

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

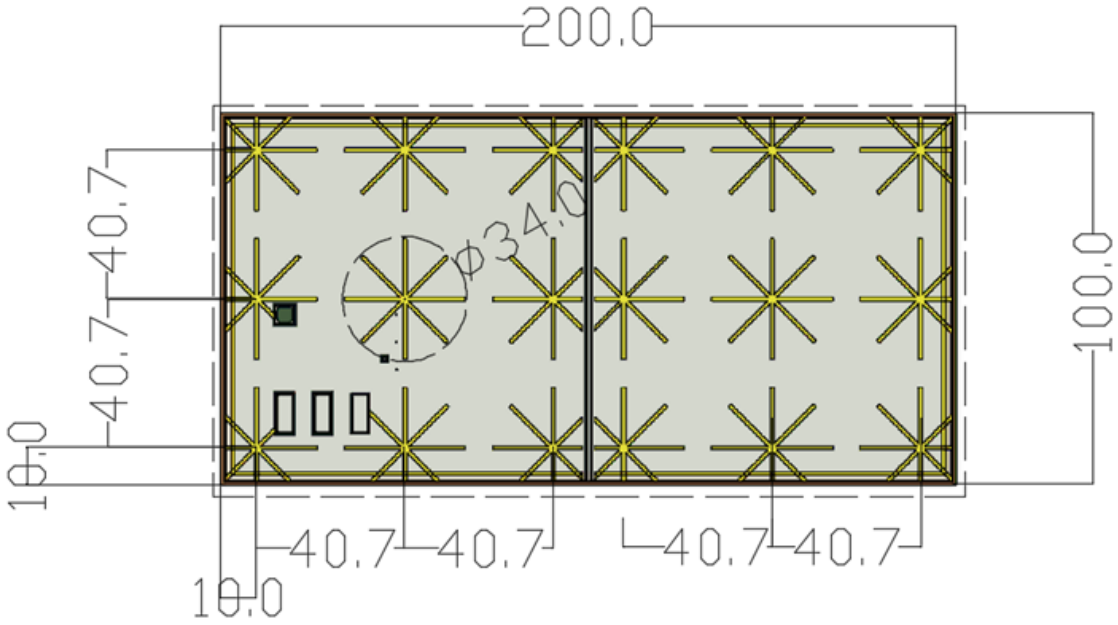

Figure 5. Detail of Star Scrim Patterns and Edge Scrim Layout

9.7.5.7 Scrim may be moved or trimmed as required to avoid large obstructions not shown in the design documentation. In addition, it is acceptable to cut holes in scrim to go around small penetrations.

9.7.5.8 In the field of the roof, a scrim segment can be moved ±3 ft from the specified layout in order to avoid obstructions that are not shown on the design documentation. In cases where many scrim segments need to be moved, contact Qorbo Enterprises, LLC.

9.7.6 *Install and Air Seal the Membrane:*

9.7.6.1 Sheets of membrane are welded together per manufacturer specifications to create a single, airtight sheet that fits over the air distribution layer. The membrane is loose laid and to be attached or adhered and air-sealed to the building structure at all membrane termination points.

9.7.6.2 Air sealing the membrane beyond weather sealing is required. The membrane must be air sealed at all terminations, including roof edges, walls, penetrations, curbs, drains, scuppers, expansion joints, visible dividers and any unique termination points. The air seals must meet the guidelines in the manufacturer installation manual and/or in the membrane manufacturer installation guide, whichever is the more stringent.

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

9.7.7 *Install the Quadravent with Preinstalled Boot:*

9.7.7.1 Carefully cut the pattern shown in **Figure 6** into the membrane at the Quadravent locations specified by the layout document. Do not cut the 12.0" cuts beyond the edge of the Quadravent flange (which is 12.0" in diameter).

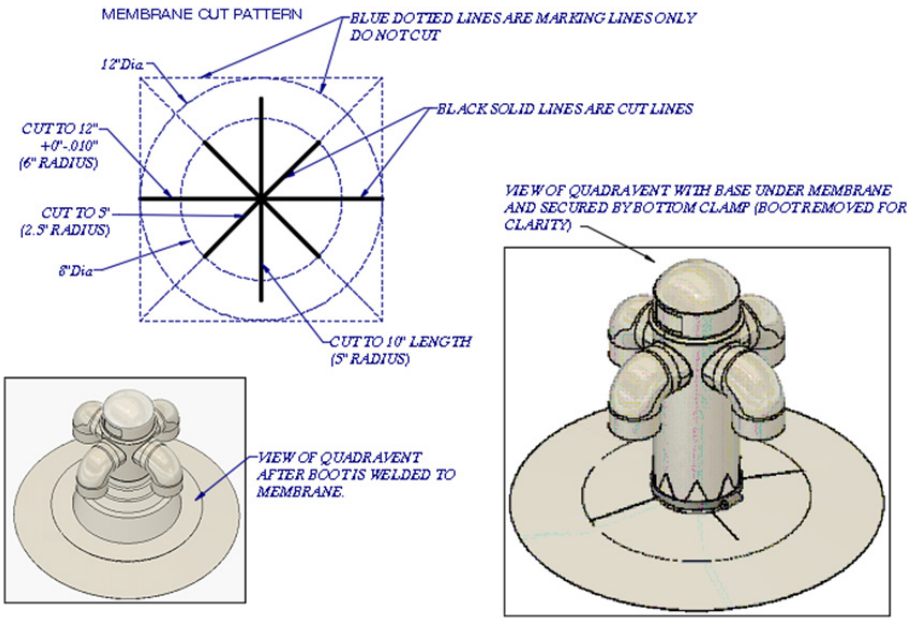

Figure 6. Detailed Drawing of Membrane Cut Pattern

9.7.7.2 The location of each Quadravent cut pattern should coincide with the center of the scrim star pattern below the membrane.

9.7.7.3 Place a Quadravent at each cut pattern with the flange positioned under the membrane through the large slits and aligned per the design specifications.

9.7.7.4 Orient the Quadravent per the layout design, which is typically determined by the location of the Quadravent as shown in **Figure 7**.

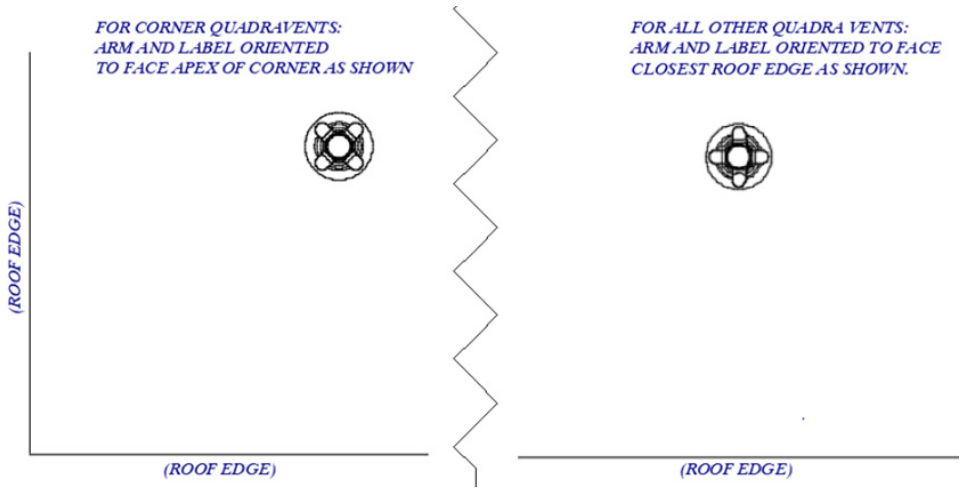

Figure 7. Detailed Drawing of Quadravent Orientation

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

9.7.7.5 Lift the boot to expose the clamp and position the clamp at the top of the cut triangles of the membrane (**Figure 6**) and torque down.

9.7.7.6 Lower the boot so that the boot flange makes contact with the membrane. Weld the boot flange to the membrane per the membrane manufacturer specification. The finished product should look similar to **Figure 1**. The resultant roof assembly cross section at the Quadravent is shown in **Figure 8**.

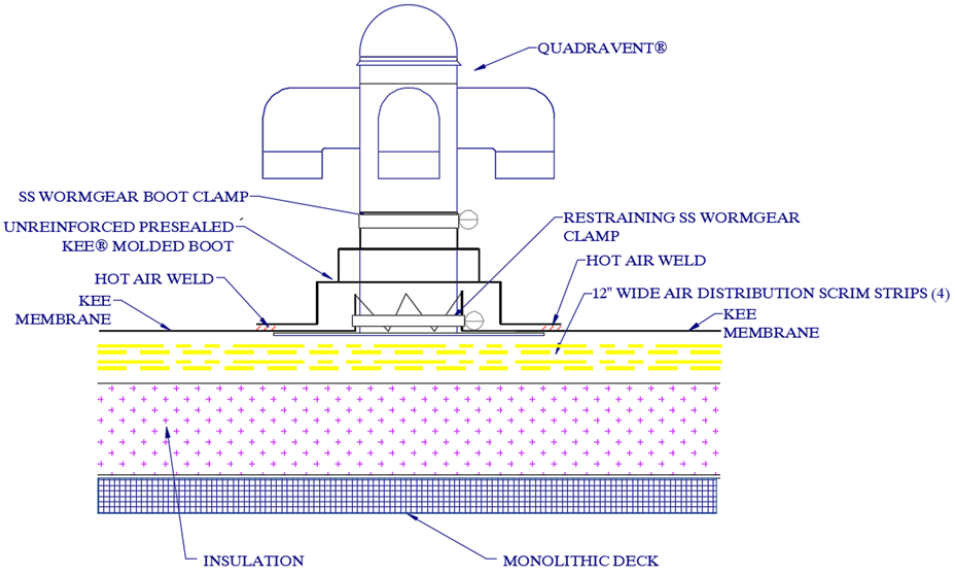

Figure 8. Detailed Drawing of Resulting Typical Roof Assembly at the Quadravent

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 Uplift resistance in accordance with FM 4474 and UL 1897

10.1.2 Wind tunnel testing

10.1.3 Computational Fluid Dynamics (CFD) Study

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.

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

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.[32]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for Quadravent on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, Quadravent 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, Quadravent shall be approved for the following applications:

11.2.1 Use to resist wind loads on low-slope roofs with loose-laid membranes.

11.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Qorbo Enterprises, LLC.

11.4 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[33] 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**:[34] Building regulations require that the building official shall accept Duly Authenticated Reports.[35]

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.[36]

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 Roof assembly materials must meet the requirements listed in **Section 2.3**.

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

12.4 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:

12.4.1 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.

12.4.2 This report and the installation instructions shall be submitted at the time of permit application.

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

12.4.4 At a minimum, this innovative product shall be installed per **Section 9** of this report.

12.4.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.

12.4.6 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.

12.4.7 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.

12.5 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.

12.6 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).

12.7 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 For additional technical information, please contact Qorbo Enterprises, LLC at www.qorboenterprises.com or info@qorboenterprises.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 Quadravent 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.

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

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),[37] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years[38] and/or a $5,000,000 fine or 3 times the value of[39] 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[40] 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.[41]

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.[42]

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

1.3 **Approved**[43] **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.[44] 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.[45]

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 deemed[46] 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[47] (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,

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

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,[48] 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)*".[49] 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[50] and Part 3280,[51] 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*."

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

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.[52]

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.[53]

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.[54]

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.[55]

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.[56]

1.11.4 Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.[57]

1.12 Approval equity is a fundamental commercial and legal principle.[58]

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

Appendix B

Design Example using Allowable Stress Design and ASCE 7-10 Table 30.4-1 Steps to Determine C&C Wind Loads Enclosed and Partially Enclosed Low-rise Buildings

Step 1: Determine risk category, see Table 1.5-1

Risk Category = III

Step 2: Determine the basic wind speed, V, for applicable risk category, see Fig. 26.5-1A, B or C

$V_{ult} := 120$

$V := V_{ult}$ V = V_ult in ASCE 7-10

Step 3: Determine wind load parameters:

$K_d := 0.85$ Wind directionality factor, see Section 26.6 and Table 26.6-1

Exposure Category = C Exposure category B, C or D , see Section 26.7

$K_{zt} := 1$ Topographic factor, see Section 26.8 and Fig. 26.8-1

Enclosure Classification = Partially Enclosed Enclosure classification, see Section 26.10

$GC_{pi} := 0.55$ Internal pressure coefficient, see Section 26.11 and Table 26.11-1

Step 4: Determine velocity pressure exposure coefficient, see Table 30.3-1

$h := 50$ Height of flat roof

$z := h$ Height above ground level

$K_h := 1.09$ Velocity pressure exposure coefficient evaluated at height z = h

Step 5: Determine velocity pressure, Eq. 30.3-1

$q_h := 0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot V^2 = 34.15$

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

Step 6: Determine external pressure coefficient, Fig. 30.4-2A for flat roofs

$GC_{p\_zone1} := -1.0$ Negative external pressure coefficient for Zone 1, rounded up to h=10 ft

$GC_{p\_zone2} := -1.8$ Negative external pressure coefficient for Zone 2, rounded up to h=10 ft

$GC_{p\_zone3} := -2.8$ Negative external pressure coefficient for Zone 3, rounded up to h=10 ft

Step 7: Calculate wind pressure, Eq. 30.4-1

$p_{zone1} := q_h \cdot \left(GC_{p\_zone1} - GC_{pi}\right) = -52.9$

$p_{zone2} := q_h \cdot \left(GC_{p\_zone2} - GC_{pi}\right) = -80.3$

$p_{zone3} := q_h \cdot \left(GC_{p\_zone3} - GC_{pi}\right) = -114.4$

CHECK: All wind pressures are less than the nominal wind uplift resistance.

Roof Dimensions:

$l := 100$ Length of roof

$w := 100$ Width of roof

$A := l \cdot w = 10000$ Area of roof

$a := 0.1 \cdot l = 10$

$A_{zone3} := 4 \cdot a \cdot a = 400$

$A_{zone2} := \left(2 \cdot a \cdot \left(l - \left(2 \cdot a\right)\right)\right) + \left(2 \cdot a \cdot \left(w - \left(2 \cdot a\right)\right)\right) = 3200$ Area of Zone 1

$A_{zone1} := \left(l - \left(2 \cdot a\right)\right) \cdot \left(w - \left(2 \cdot a\right)\right) = 6400$ Area of Zone 2

$A_{total} := A_{zone1} + A_{zone2} + A_{zone3} = 10000$ Area of Zone 3

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

Minimum Number of Quadravents Calculation: Using the uplift resistance of the Quadravent provided in the TER, calculate the required number of vents for the roof area.

$R_{ASD} := 0.6$ — ASD reduction factor to account for V_ult wind loads

$P_{ult} := 345$ — Ultimate wind uplift resistance of the Quadravent, psf

$DSF := 2$ — Design safety factor used per *FM 4474* for example only. Other design safety factors may be used where applicable.

$P_N := \frac{P_{ult}}{DSF} = 172.5$ — Nominal wind uplift resistance of the Quadravent, psf

$A_T := 12 \cdot 24 = 288$ — Surface area of test, ft^2

$F_N := P_N \cdot A_T = 49680$ — Nominal force resistance per Quadravent, lb

$L_{W\_zone1} := A_{zone1} \cdot p_{zone1} = -338813$ — Wind load on Zone 1

$L_{W\_zone2} := A_{zone2} \cdot p_{zone2} = -256842$ — Wind load on Zone 2

$L_{W\_zone3} := A_{zone3} \cdot p_{zone3} = -45767$ — Wind load on Zone 3

$L_W := -\left(L_{W\_zone1} + L_{W\_zone2} + L_{W\_zone3}\right) \cdot R_{ASD} = 384853$ — Total wind load on the roof, lb

$N_{vents} := \frac{L_W}{F_N} = 8$ — Minimum number of vents required

NOTE: Vents are spaced according to the requirements set forth in the TER and the Quadravent roof system design provided by Qorbo Enterprises LLC.

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

Issue Date: January 23, 2023
Subject to Renewal: July 1, 2025

FBC Supplement to Report Number 1906-01

REPORT HOLDER: Qorbo Enterprises, LLC

1 Evaluation Subject

1.1 Quadravent

2 Purpose and Scope

2.1 Purpose

2.1.1 The purpose of this Report Supplement is to show Quadravent, recognized in Report Number 1906-01, 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 #41888)*

2.2.2 *FBC-R—20, 23: Florida Building Code – Residential (FL #41888)*

3 Conclusions

3.1 Quadravent, described in Report Number 1906-01, 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 110.3 replaces IBC Section 110.3

3.2.4 FBC-B Section 1503.2 replaces IBC Section 1503.2

3.2.5 FBC-B Section 1504.3 replaces IBC Section 1504.4

3.2.6 FBC-B Section 1504.5 replaces IBC Section 1504.6

3.2.7 FBC-B Sections 1507.12 and 1507.13 replaces IBC Section 1507.12

4 Conditions of Use

4.1 Quadravent, described in Report Number 1906-01, must comply with all of the following conditions:

4.1.1 All applicable sections in Report Number 1906-01.

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

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

Notes

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

2 2018 IBC Section 1507.12 and 2018 IBC Section 1507.13

3 2018 IBC Section 1504.5

4 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702

5 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

6 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

7 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

8 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies

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

10 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency

11 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source

12 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.

13 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/

14 https://www.cbitest.com/accreditation/

15 https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104:~:text=to%20enforce%20the%20provisions%20of%20this%20code

16 https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11:~:text=Where%20the%20alternative%20material%2C%20design%20or%20method%20of%20construction%20is%20not%20approved%2C%20the%20building%20official%20shall%20respond%20in%20writing%2C%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%2C%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%2C%20stating%20the%20reasons%20therefore

17 https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~: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

18 https://iaf.nu/en/about-iaf-mla/#:~: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

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

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

21 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.

22 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.

23 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#listed AND https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled

24 2018 IBC Section 1504.3.1

25 2018 IBC Section 1504.3

26 https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4

27 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%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

28 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

29 2018 IBC Section 1504.3

30 2018 IBC Section 1504.3.1

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC

[31] 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.

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

[33] 2018 IFC Section 104.9

[34] 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.

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

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

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

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

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

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

[41] IBC 2021, Section 1706.1 Conformance to Standards

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

[43] See Section 11 for the distilled building code definition of **Approved**

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

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

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

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

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

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

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

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

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

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

[54] 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/

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

[56] https://iaf.nu/en/about-iaf-mla/#:~: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

[57] True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

[58] https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

Confidential Intellectual Property Is protected by Defend Trade Secrets Act 2016, ©DrJ Engineering, LLC