

Product Evaluation Report

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Product Manufacturer

Renaissance Windows and Doors
13340 International Parkway
Jacksonville, FL 32218

Product Name, Model and/or Description

Clipped Aluminum Tube Mullion
Impact Resistant

Code: Current Edition of the Florida Building Code including the 8th Edition (2023) Florida Building Code

Compliance Method: Product Approval Rule 61G20-3.005(2)(b) – Product Evaluation Report by a Licensed Professional Engineer

Product Name, Model and/or Designation: Products covered by this evaluation include the following.

- Clipped Aluminum Tube Mullion – Impact Resistant

Code Conformance:

This product is designed to comply with the Current Edition of the Florida Building Code (FBC) requirements excluding the High Velocity Hurricane Zone (HVHZ).

The Current Edition of the Florida Building Code (FBC) and Current Edition of the Florida Residential Code (FRC) requirements specific to this product that have been met by engineering evaluation (Evaluation No. 2278) and depicted on the installation drawings (RWD0005) are the following.

- Current Edition of the Florida Building Code
 - Chapter 17 – Section 1709.8 Mullions
 - Mullions may be qualified by accepted engineering practice to criteria cited in this section.
 - Chapter 16 – Section 1609.1.2 Protection of Openings
 - See discussion below.
- Current Edition of the Florida Residential Code
 - Chapter 6 – Section R609.8 Mullions
 - Mullions may be qualified by accepted engineering practice to criteria cited in this section.
 - Chapter 3 – Section R301.2.1.2 Protection of Openings
 - See discussion below.

Impact testing of the mullion system is not intrinsically required by ASTM E1996-14a when limited to Wind Zone 3 as discussed below. References below pertain to ASTM E1996-14a.

Structural Analysis of Mullions: Chapter 17/FBC and Chapter 6/FRC on Mullions address methods of qualification of mullions which includes structural calculation as provided for by a Professional Engineer. These sections do not intrinsically address impact requirements.

From Current Edition of the FBC for Protection of Openings:

Protection of openings. In wind-borne debris regions, glazed openings in buildings shall be impact resistant or protected with an impact-resistant covering



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meeting the requirements of ANSI/DASMA 115 (for garage doors and rolling doors) or TAS 201, 202 and 203, AAMA 506, ASTM E1996 and ASTM E1886 referenced herein, or an approved impact-resistant standard as follows:....

From Current Edition of the FRC for Protection of Openings:

Protection of openings. Exterior glazed openings in buildings located in windborne debris regions shall be protected from windborne debris. Glazed opening protection for windborne debris shall meet the requirements of the Large Missile Test of ASTM E1996 and ASTM E1886 as modified in Section 301.2.1.2.1, TAS 201, 202 and 203, or AAMA 506, as applicable. Garage door glazed opening protection for windborne debris shall meet the requirements of an approved impact-resisting standard or ANSI/DASMA 115.

These sections of the FBC state that ASTM E1996 can be used for impact protection testing. They do not give any specific requirements as to how. You must refer to ASTM E1996 for specific requirements.

ASTM E1996-14a

Section 4.5 Fenestration assemblies and impact protective systems intended to be mulled together shall be tested separately or tested by combining three specimens into one mounting frame separated only by the mullions.

This section indicates that the windows can be tested as a mullied assembly or with each product separately. No requirement exists to impact the mullion.

X 4.4.2.1 In Wind Zone 4, impact the integral mullion and other intermediate members such as meeting rail, check rail, for meeting stile mid-span in lieu of the impact specified in 5.3.2.3 if applicable.

X 4.4.2.2 In Wind Zone 4, for each type of mullion impact one vertical or horizontal combination mullion with the longest span at mid span in addition to impacts specified in 5.3.

This indicates that the mullion (whether integral or acting as reinforcement) MUST be impacted for Wind Zone 4 only. This evaluation report limits the mullion system to Wind Zone 3. Therefore, the mullion does not have to be impacted and the assemblies can be qualified per Section 4.5 above.

For use in an impact resistant assembly, the mulled fenestration must also have met testing to ASTM E1996. If not, then a tested and product approved *impact protective system* is required.

The following sections address the Current Edition of the FBC requirements for either testing or engineering mullions. The subject clipped-end mullion system has been evaluated in accordance with the engineering options allowed by the code.

Current Edition of the FBC, Chapter 17 - Mullions

Mullions. Mullions or mulled fenestration assemblies shall be tested by an approved testing laboratory in accordance with either ASTM E330, or TAS 202 (HVHZ shall comply with TAS 202) or shall be engineered using accepted engineering practice such as AAMA 450.



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Mullions tested as stand-alone units or qualified by engineering shall use performance criteria cited in Sections "Load Transfer", "Deflection" and "Structural Safety Factor".

Load transfer. Mullions shall be designed to transfer the design pressure loads applied by the window and door assemblies to the rough opening substrate.

Deflection. Mullions shall be capable of resisting the design pressure loads applied by the window and door assemblies to be supported without deflecting more than $L/175$, for spans up to and including 13 feet 6 inches, and $L/240 + 1/4$ inch for spans over 13 feet 6 inches, where L is the span of the mullion in inches.

Structural safety factor. Mullions that are tested by an approved testing laboratory shall be capable of resisting a load of 1.5 times the design pressure loads applied by the window and door assemblies to be supported. The design pressures, as determined from ASCE 7, are permitted to be multiplied by 0.6. Mullions that are qualified by engineering shall be capable of resisting the design pressure loads applied by the window and door assemblies to be supported without exceeding the allowable stress of the mullion elements.

Current Edition of the FRC, Chapter 6 - Mullions

Mullions. Mullions shall be tested by an approved testing laboratory in accordance with AAMA 450 or be engineered in accordance with accepted engineering practice. Mullions tested as stand-alone units or qualified by engineering shall use performance criteria cited in Sections "Load Transfer", "Deflection" and "Structural Safety Factor". Mullions qualified by an actual test of an entire assembly shall comply with "Load Transfer" and "Structural Safety Factor".

Load transfer. Mullions shall be designed to transfer the design pressure loads applied by the window and door assemblies to the rough opening substrate.

Deflection. Mullions shall be capable of resisting the design pressure loads applied by the window and door assemblies to be supported without deflecting more than $L/175$, for spans up to and including 13 foot 6 inches, and $L/240 + 1/4$ inch for spans over 13 foot 6 inches, where L is the span of the mullion in inches.

Structural safety factor. Mullions shall be capable of resisting a load of 1.5 times the design pressure loads applied by the window and door assemblies to be supported without exceeding the appropriate material stress levels. If tested by an approved laboratory, the 1.5 times the design pressure load shall be sustained for 10 seconds, and the permanent deformation shall not exceed 0.4 percent of the mullion span after the 1.5 times design pressure load is removed.

Conclusion: Based on the previous discussion, a mullion system limited to Wind Zone 3 may be engineered using the requirements of FBC Chapter 17 – Section 1709.8 Mullions and FRC Chapter 6 – Section R609.8 Mullions.



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Installation Drawings:

- RWD0005, First Issue, dated 12/10/19, signed and sealed by Robert J. Amoruso, Renaissance Windows and Doors Clipped Aluminum Tube Mullion – Impact Resistant – Mullion Span vs. Load Width Tables – Installation Anchorage Details.

Evaluations:

- PTC Report No. 2278, Rev. 1, dated 12/10/19, Mullion Span vs. Load Width Evaluation and Anchorage Engineering for Renaissance Windows and Doors Clipped Aluminum Tube Mullion, signed and sealed by Robert J. Amoruso.

References:

1. Current Edition of the Florida Building Code
 - a. Chapter 17 – Section 1709.8 Mullions
 - b. Chapter 16 – Section 1609.1.2 Protection of Openings
2. Current Edition of the Florida Residential Code
 - a. Chapter 6 – Section R609.8 Mullions
 - b. Chapter 3 – Section R301.2.1.2 Protection of Openings
3. ASTM E1996-14a

Limitations & Conditions of Use:

- This product has not been evaluated for use inside the High Velocity Hurricane Zone (HVHZ).
- This product can be used in mulled assemblies of impact resistant fenestration units but is limited to Wind Zone 3, Missile Level D.
- This product can be used in mulled assemblies of non-impact resistant fenestration units.
- Refer to Product Installation Instructions noted above for:
 - Maximum allowable wind loads.
 - Overall dimensions and material/grade of main product components, accessories, etc.
 - Illustrated diagrams of the attachment of the product to substrate structure.
 - Anchor type(s), size(s), substrate(s), embedment, edge distance, and spacing/locations.
- Site wind pressures shall be determined by a licensed professional engineer in accordance with the current edition of the Florida Building Code (and/or ASCE 7 as referenced in the current edition of the Florida Building Code) for components and cladding based on allowable stress design.
- Site conditions not covered in this product evaluation document are subject to additional engineering analysis by a licensed professional engineer or registered architect as required by the authority having jurisdiction.
- Adequacy of the existing structural substrates as a main wind force resisting system capable of withstanding and transferring applied product loads to the foundation is the responsibility of the licensed professional engineer or registered architect acting as the design professional of record for the project of installation.



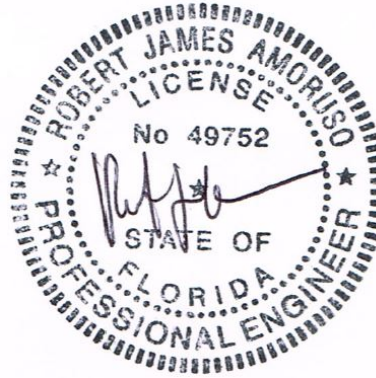
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Certificate of Independence per Product Approval Rule 61G20-3.009

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Digitally signed
by Robert J
Amoruso

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Evaluated By:
Robert J. Amoruso, P.E.
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