

Product Evaluation Report

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Product Manufacturer

Pella Corporation
102 Main Street
Pella, Iowa 50219

Product Name, Model and/or Description

Impervia Fiberglass 1.0 Window Frame
Mullion System

Mull Span vs. Load Width Rating Tables & Installation Details

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

Compliance Methods: Florida Product Approval Rule and Florida Building Code

- Rule No. 61G20-3.005(1)(d) – Product Evaluation Report by a Licensed Professional Engineer
- AAMA 450-10, Option 3

Code Conformance Evaluation:

The purpose of this evaluation is to determine product grouping of Pella Impervia Fiberglass Windows for testing of a combination mullion system with and without a mullion reinforcing as well as tight mullion (w/o reinforcing mullion) system.

Product grouping is in accordance with AAMA 450-10, Option No. 3 and Section 6.0 is detailed in Reference 1.

Based on this product grouping, the following mulled configurations are tested using various reinforced and unreinforced (tight) assemblies (see Reference 2). Based on this testing comparative analysis are generated for (a) the mullion assemblies listed in the Analysis Method and (b) various mullion spans vs. load widths. See Analysis Method below for additional details.

Rational Analysis:

1. PTC Product Design Group, Inc. Product Evaluation Report No. 2645, Impervia Fiberglass 1.0 Window Frame Mullion System, AAMA 450-10 Mullion Grouping, Test Plan & Specimens; prepared, signed and sealed by Robert J. Amoruso, FL PE No. 49752.
2. PTC Product Design Group, Inc. Calculation No. 2692, Impervia Fiberglass 1.0 Window Frame Mullion System, Installation Anchorage Allowables; prepared, signed and sealed by Robert J. Amoruso, FL PE No. 49752.

Product Applicability: This report is applicable to the following product lines and types.

1. Product Lines
 - a. Pella Impervia 1.0 Fiberglass Windows
2. Product Types
 - a. Double Hung Window,
 - b. Single Hung Window,
 - c. Sliding Window, and
 - d. Fixed Window.
3. Product Materials
 - a. Windows are Pella Fiberglass composite
 - b. Structural Mullion is Extruded Aluminum 6063-T6
 - c. Structural Mullion Reinforcement is Mild-Carbon Steel

PTC Product Design Group, LLC | PO Box 520775 | Longwood, FL 32752-0775
321-690-1788 | FL Certificate of Authorization No. 25935

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Analysis Methodology: The following methodology was used to develop the Load Width/Span Tables presented in the appendixes.

1. The tributary areas are identified and calculated.
2. These tributary areas are used to calculate the maximum pressure that the mullion can withstand without exceeding the allowable stresses or deflection and anchorage due to mullion end loading.
3. The minimum of these results is selected and defined as the design pressure for the mullion. Mullion stress and deflection is calculated using the AAMA 450 load distribution method.
4. For each mullion configuration, spreadsheet programs are used to calculate the equivalent Moment of Inertia (I) and Section Modulus (S) or the composite mullion/frame sections. The equivalent I and Z are determined based on fiberglass. This is done by a ratio of the Modulus of Elasticity (E) and Moment of Inertia (I) for the steel and aluminum components as compared to the fiberglass, to arrive at an equivalent I and Z for the combined section properties of the mullion/frame.
5. The worst-case framing component (1.0 Casement/Awning Frame, Fixed and Operable, ID No. DES-601N) was determined in Reference 1 and exhibits the lowest section properties of the window types previously listed.
6. Structural Analysis based on:
 - a. Horizontal Shear Stress = P/A (psi)
 - i. P is shear load
 - ii. A is web area
 - b. Bending Stress = $Mc/I = M/Z$ (psi)
 - i. M is bending moment and is equal to M/K_f
 - ii. K_f is moment coefficient based on trapezoidal distribution.
 - c. Deflection = WL^3 / K_dEI
 - i. K_d is deflection coefficient based on trapezoidal distribution.
 - ii. W is load on mullion in lbs = wL where w is distributed load in lbs/in and L in mullion span in inches.
 - d. Mullion End Load Reactions
 - i. Based on trapezoidal load on mullion resolved into total load distributed to each end of mullion.
 - e. Comparative Analysis of Tested Assembly with various mull spans vs. load widths and mullion assemblies (listed below) is conducted in Reference 3.
 - i. Mullion Assembly types reviewed.
 1. Tight Mullion
 2. 1/2" Mullion
 3. 1/2" Mullion + 1 Reinf
 4. 1" Mullion
 5. 1" Mullion + 1 Reinf
 6. 1" Mullion + 2 Reinf
 - ii. The tributary loading area for various mullion span and load widths is determined and compared to the as-tested tributary loading area. This comparison considers the loading as related to Bending, Deflection and End Load Reactions (anchorage).
 - iii. The above comparison is extended to each of the mullion assembly types listed in 6.e.ii above.
 1. For the comparative analysis of the as-tested mullion assembly to the same mullion assembly and tributary loading areas, the resulting Design Pressure is equal to that in testing.

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2. For increases in tributary loading area, the resulting DP will decrease when the as-tested and as-compared mullion assembly are the same. Conversely, a decrease in tributary loading area results in an increase in DP.
 3. For increases in the mullion assembly section properties, the resulting DP will increase when the as-compared mullion assembly properties exceed that of the as-tested mullion assembly. Conversely, a decrease in the mullion assembly section properties of the as-compared mullion assembly results in a decrease in DP.
7. Anchorage Analysis based on:
- f. Using the anchor allowables determined in Reference 4 and the mullion end loading, the quantity of anchors required is determined in Reference 3.

Mullion Components: See Appendix A for mullion components and assemblies.

Installation Requirements: See Appendix B for basic installation requirements.

Mull Span vs. Load Width Table Usage: See Appendix C for Mull Span vs. Load Width Load Rating Tables usage instructions.

Mull Span vs. Load Width Tables: See Appendix D Mull Span vs. Load Width Load Rating Tables.

Limitations & Conditions of Use:

- This product has not been evaluated for use inside the HVHZ (High Velocity Hurricane Zone).
- This product will require an impact protective device when used in Wind Borne Debris Regions.
- Refer to Product Installation Instructions noted above for:
 - Maximum allowable wind loads at related maximum allowable size(s).
 - 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.

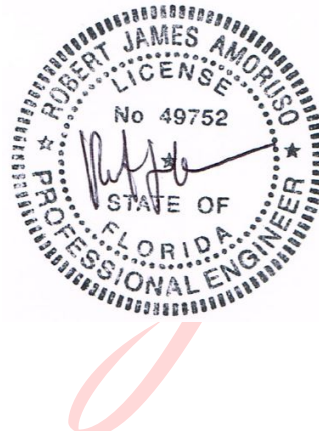
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Certificate of Independence per Product Approval Rule 61G20-3.009

PTC Product Design Group, LLC and Robert J. Amoruso, P.E. does not have, nor will acquire, any financial interest in the company manufacturing or distributing product(s) covered by this Product Evaluation Report.

PTC Product Design Group, LLC and Robert J. Amoruso, P.E. do not have, nor will acquire any financial interest in any other entity involved in the approval process or testing of the product(s) covered by this Product Evaluation Report.



Digitally
signed by
Robert J
Amoruso
Date:
2023.09.01
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-04'00'

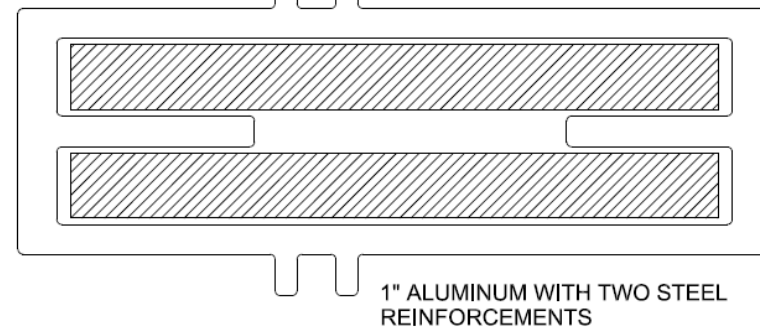
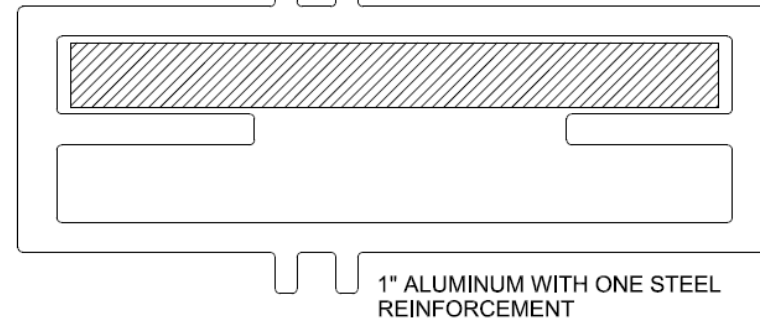
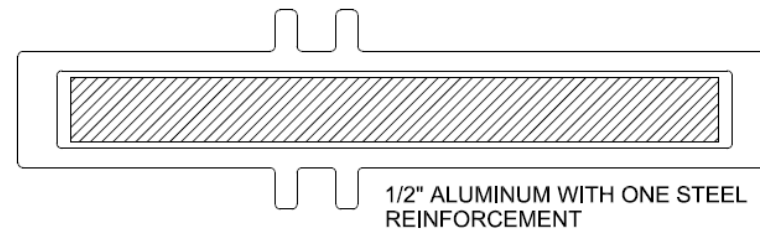
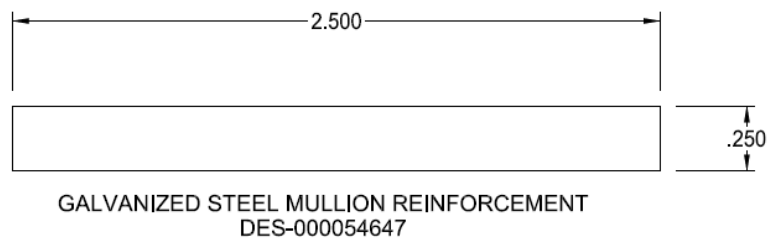
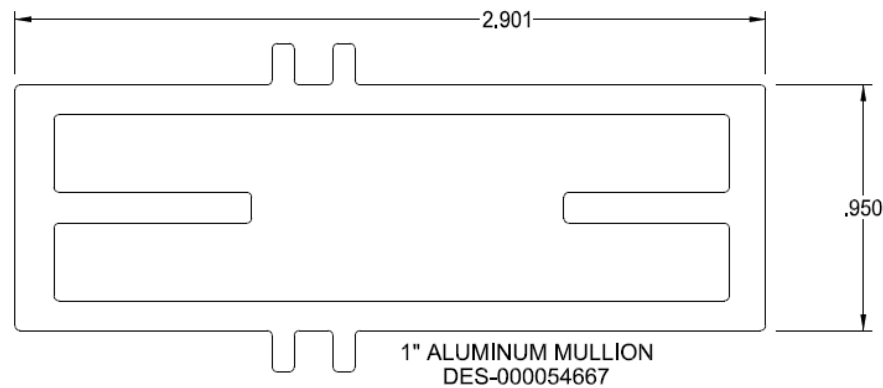
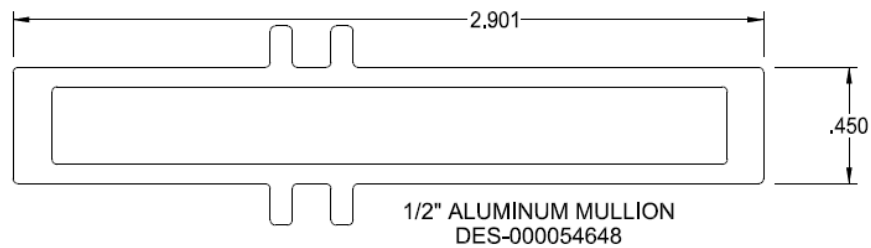
Evaluated By:
Robert J. Amoruso, P.E.
FL P.E. License Number 49752

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Appendix A – Mullion & Frame Assembly Components

Mullion Components



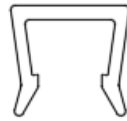
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Appendix A – Mullion & Frame Assembly Components

Mullion Covers

(these components are non-structural and may be changed as needed to accommodate interior/exterior finishes as applicable)



TIGHT MULLION COVER
DES-0AMJ



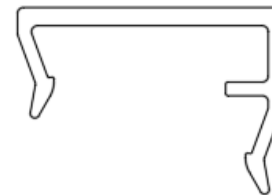
1/2" MULLION COVER
DES-0A6M



1" MULLION COVER
DES-000067325



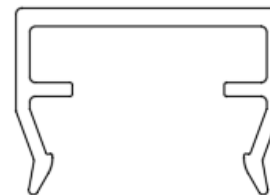
TIGHT MULLION COVER
OFFSET FRAME
DES-000057868



1/2" MULLION COVER
3" TO 3" FRAME
DES-000057838



1" MULLION COVER
3" TO 3" FRAME
DES-000057848



1/2" MULLION COVER
OFFSET FRAME
DES-000057859



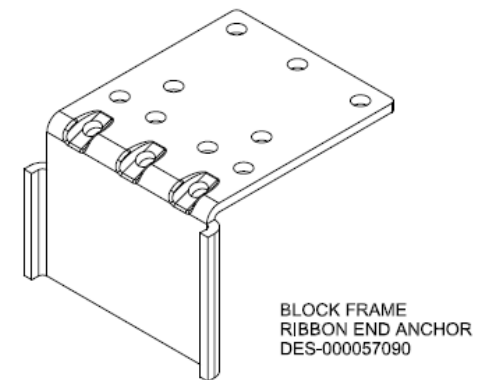
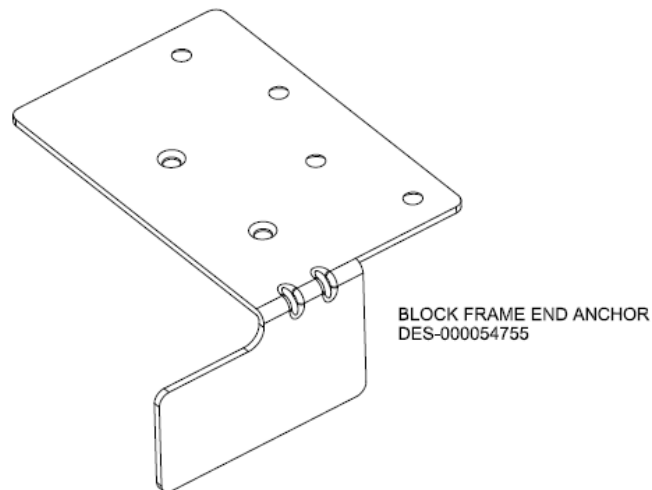
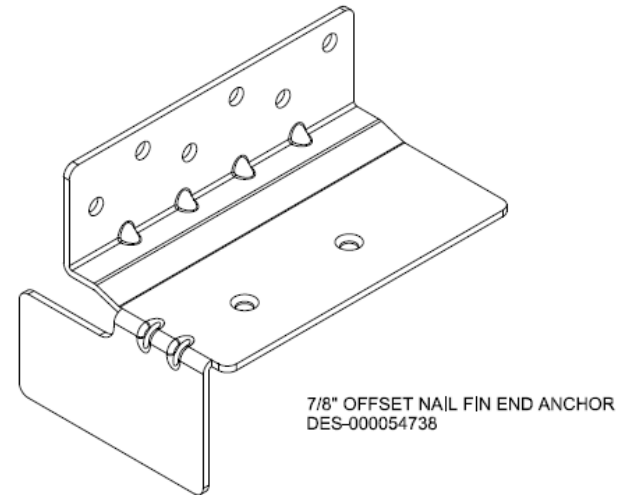
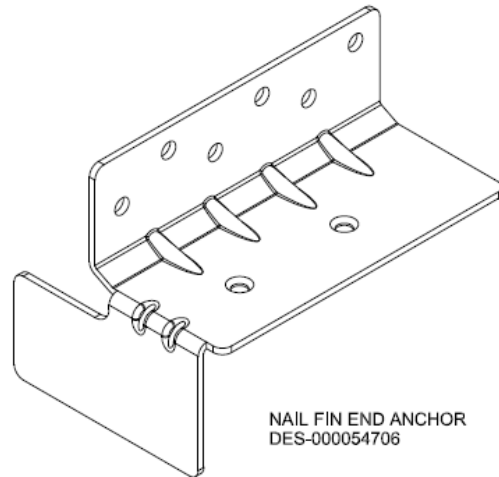
1" MULLION COVER
OFFSET FRAME
DES-000057866

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Appendix A – Mullion & Frame Assembly Components

End Clips



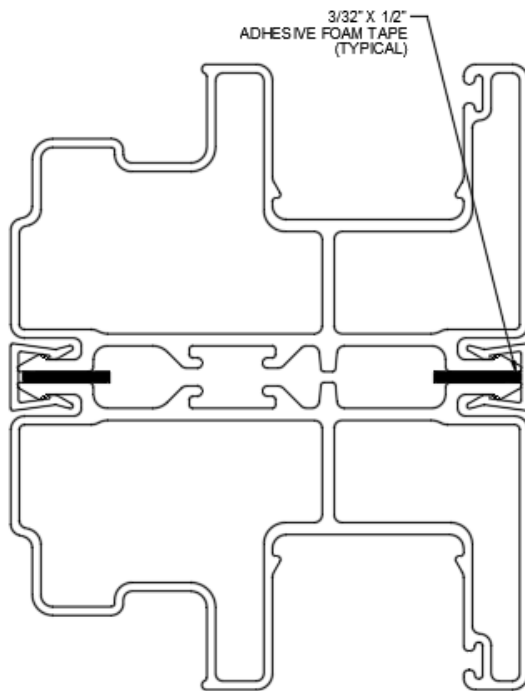
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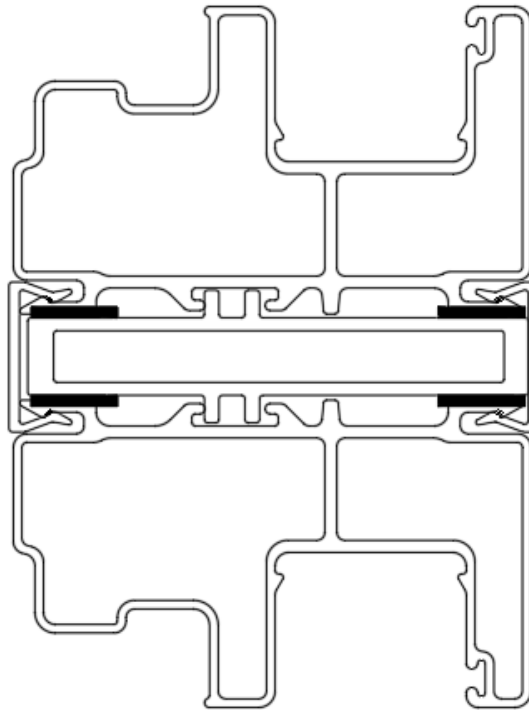
Appendix A – Mullion & Frame Assembly Components

Mullion/Frame Assemblies (DES-601N, Single Hung, Sliding, and Fixed Windows)

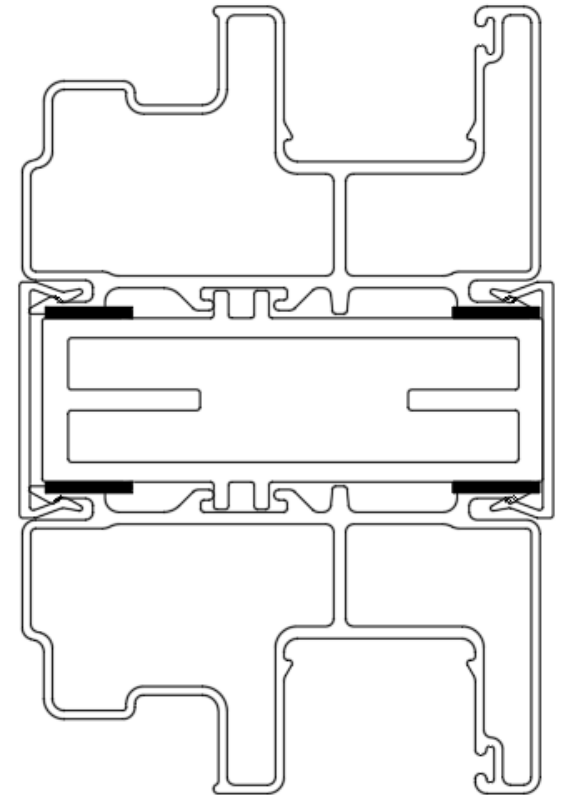
Used in AAMA 450-10 evaluation. Envelopes all Impervia 1.0 Frame Options.



TIGHT MULLION



1/2" MULLION
(ALSO AVAILABLE
WITH STEEL REINFORCEMENT)



1" MULLION
(ALSO AVAILABLE WITH
1 OR 2 STEEL REINFORCEMENTS)

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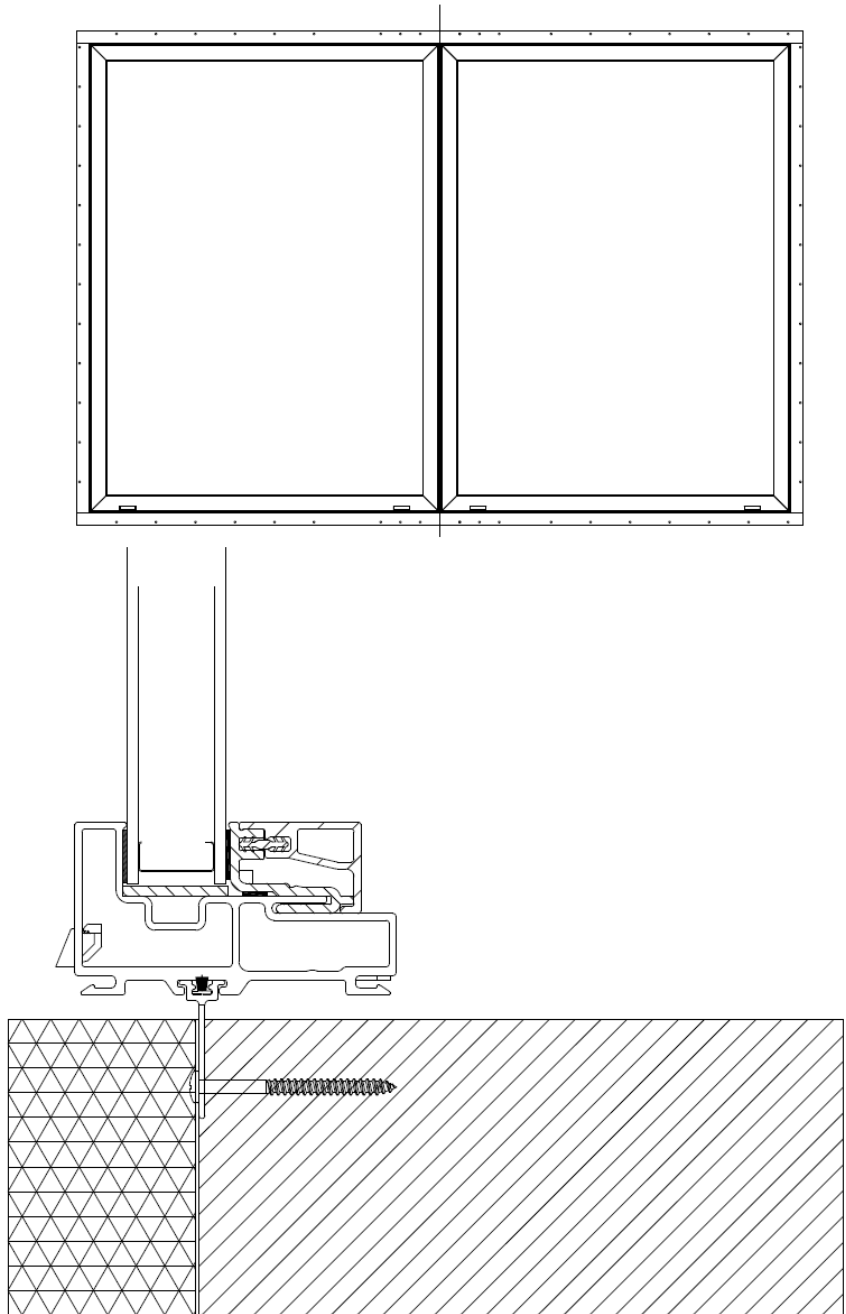
Appendix B

General Installation Methods

This installation for Fin Frame
Windows w/o Reinforcing
Mullion (Tight Mullion).

See Anchor Schedule below for
fastener requirements.

Refer to Pella Impervia Series 1.0
Mullion Installation Instructions
for further details.



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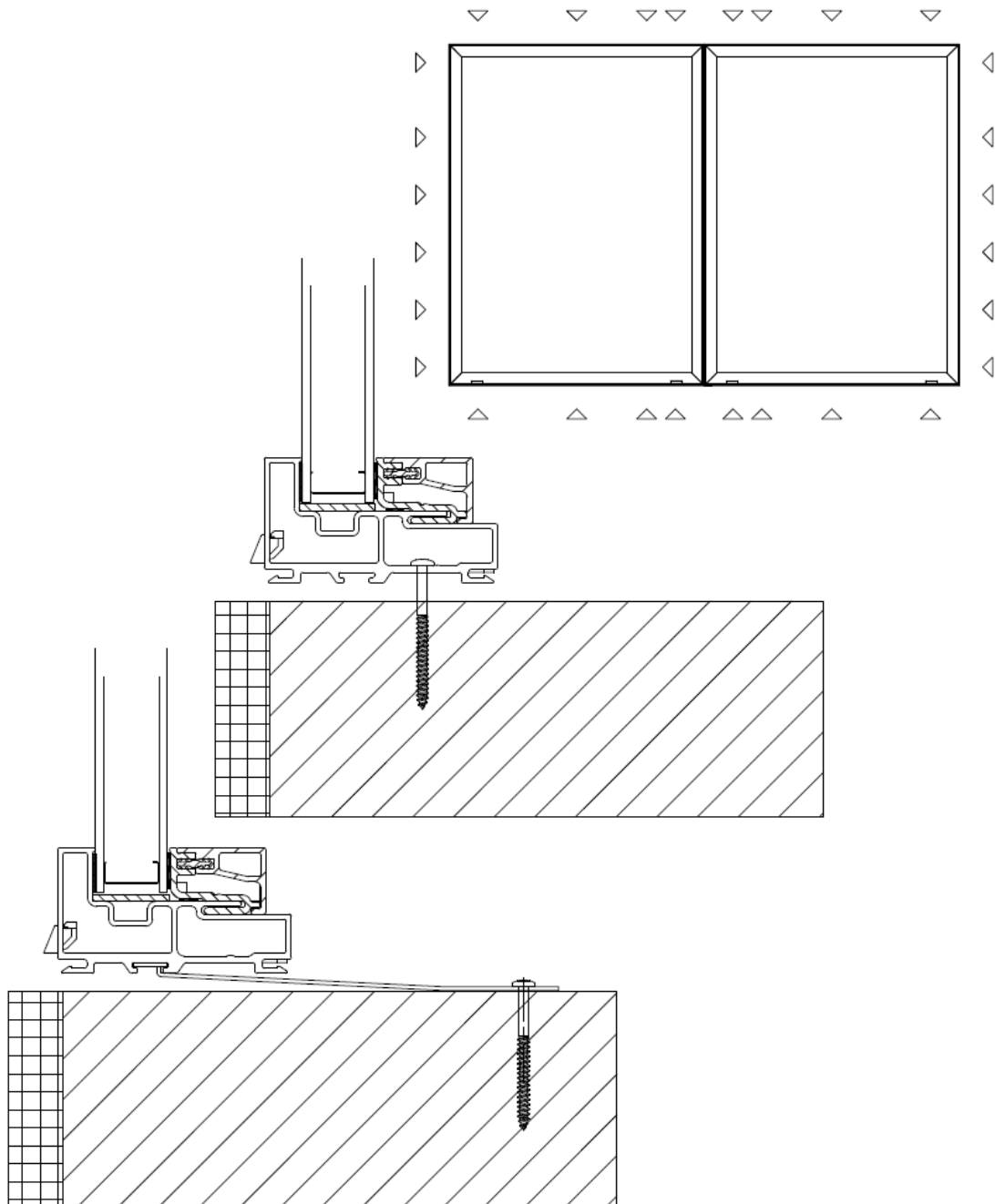
General Installation Methods

This
installation for
Block Frame
Windows w/o
Reinforcing
Mullion (Tight
Mullion).

Thru-frame or
Clip-to-frame
allowed.

See Anchor
Schedule
below for
fastener
requirements.

Refer to Pella
Impervia
Series 1.0
Mullion
Installation
Instructions
for further
details.



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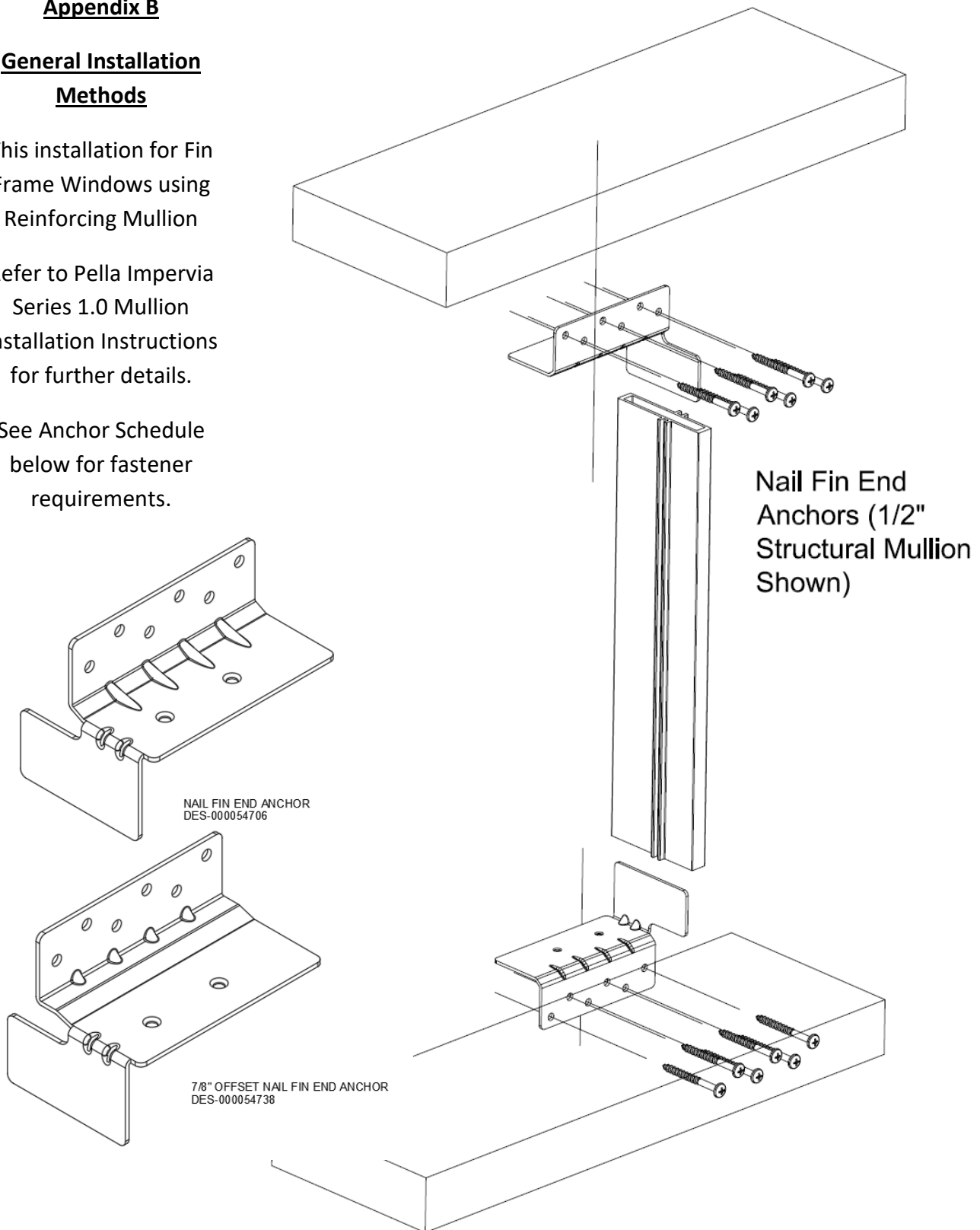
General Installation

Methods

This installation for Fin
Frame Windows using
Reinforcing Mullion

Refer to Pella Impervia
Series 1.0 Mullion
Installation Instructions
for further details.

See Anchor Schedule
below for fastener
requirements.



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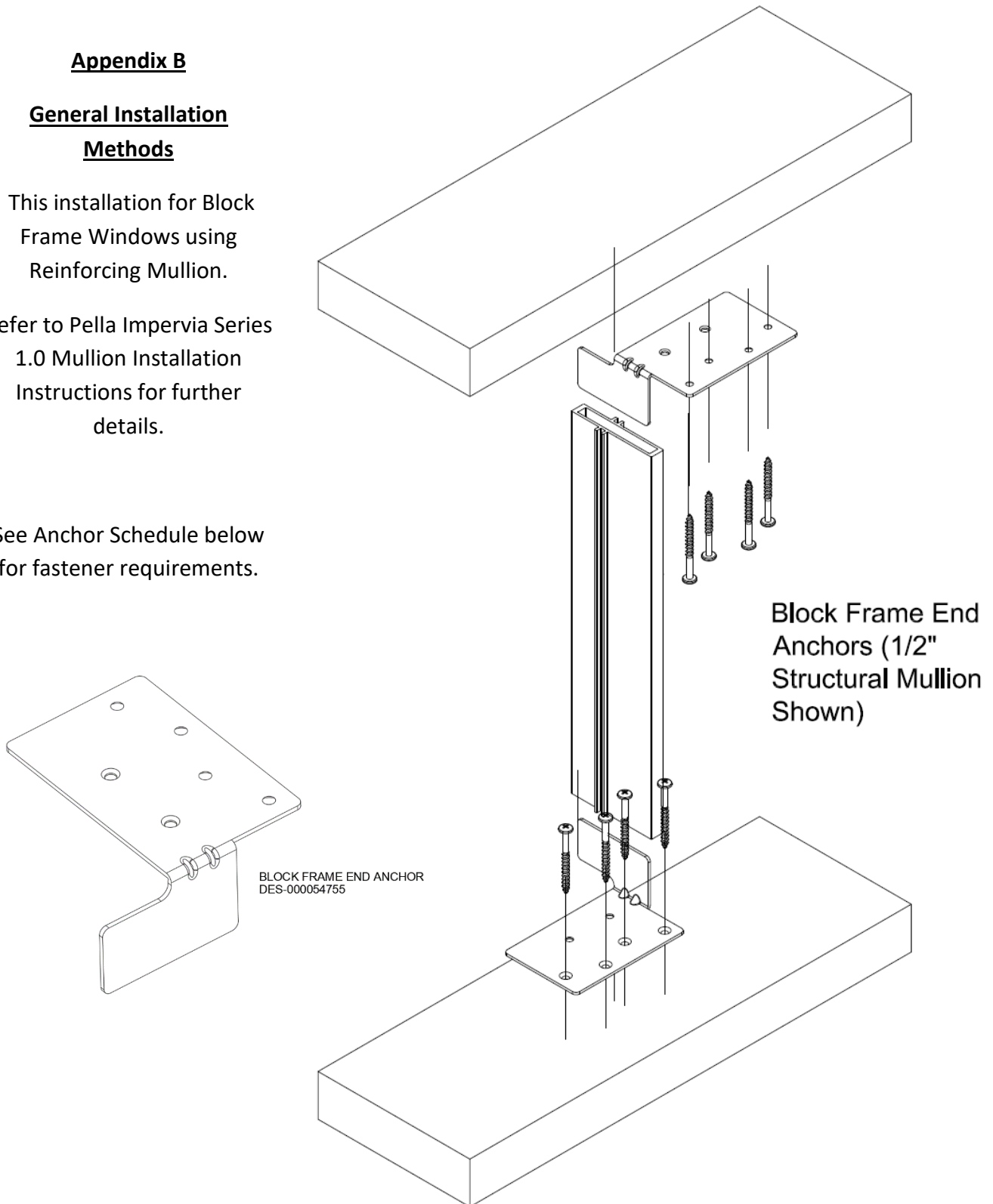
General Installation

Methods

This installation for Block
Frame Windows using
Reinforcing Mullion.

Refer to Pella Impervia Series
1.0 Mullion Installation
Instructions for further
details.

See Anchor Schedule below
for fastener requirements.



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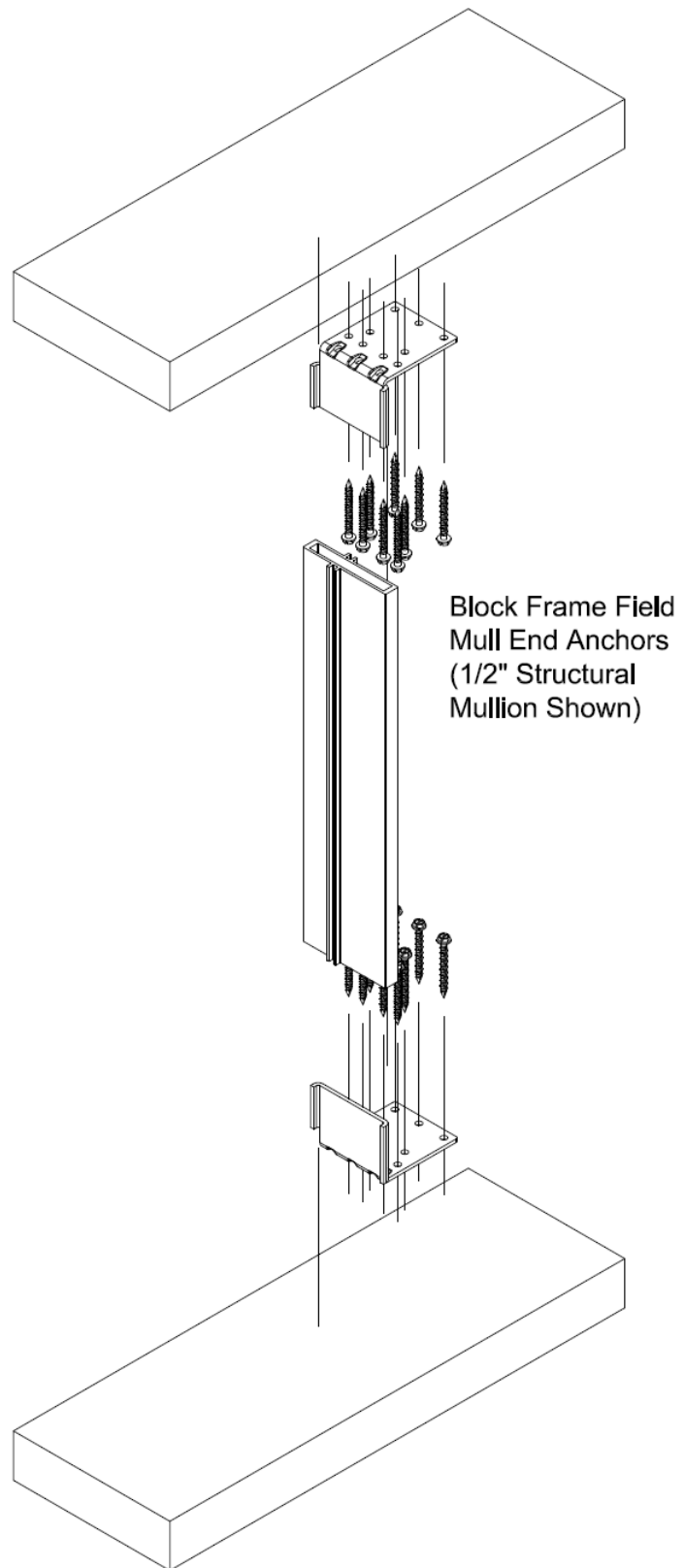
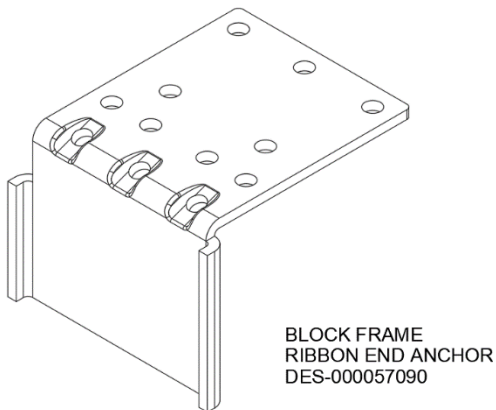
Appendix B

General Installation Methods

This installation for Block Frame Windows using Reinforcing Mullion.

Refer to Pella Impervia Series 1.0 Mullion Installation Instructions for further details.

See Anchor Schedule below for fastener requirements.



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Appendix B - General Installation Methods

ANCHOR SCHEDULE						
Clip Type (*)	Substrate	Fastener Type	Size	Embedment (in)	Spacing (in)	Edge Distance (in)
Fin	Concrete	ITW Tapcon	3/16" dia.	1-1/2"	1-1/2"	1"
	Masonry (CMU)	ITW Tapcon	NR	NR	NR	NR
	Wood	Wood Screw (ANSI B18.6.1) Tapping Screw (ANSI B18.6.4)	#10	1-1/2"	3/4"	3/4"
	Steel Stud (20 GA)	Thread Forming/Cutting Screw (ASME B18.6.4)	#10	Stud Thickness + 3 Threads	1/2"	3/8"
	1/8" Steel Tube		#10	Tube Thickness + 3 Threads	1/2"	3/8"
	1/8" Aluminum Tube		#10	Tube Thickness + 3 Threads	1/2"	3/8"
Block	Concrete	ITW Tapcon	3/16" dia.	1-1/2"	1-1/2"	1-1/8"
	Masonry (CMU)	ITW Tapcon	3/16" dia.	1"	1-1/2"	2"
	Wood	Wood Screw (ANSI B18.6.1) Tapping Screw (ANSI B18.6.4)	#10	1-1/2"	3/4"	3/4"
	Steel Stud (20 GA)	Thread Forming/Cutting Screw (ASME B18.6.4)	#10	Stud Thickness + 3 Threads	1/2"	3/8"
	1/8" Steel Tube		#10	Tube Thickness + 3 Threads	1/2"	3/8"
	1/8" Aluminum Tube		#10	Tube Thickness + 3 Threads	1/2"	3/8"

NR = Not Recommended

* See Appendix A for Clip Types used in Reinforced Mullions and Tight Mullions (where applicable). Tight Mullions also installed without clips thru-frame or thru-fin.

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Appendix C - Mull Span vs. Load Width Table Usage

Appendix D presents the Mull Span vs. Load Width Tables. This Appendix will explain their usage.

Six tables are presented representing the following mullion configurations.

1. Tight Mullion
2. 1/2" Mullion
3. 1/2" Mullion + 1 Reinf
4. 1" Mullion
5. 1" Mullion + 1 Reinf
6. 1" Mullion + 2 Reinf

To use these tables, determine the following.

- Mull window assembly type (see following pages for additional details).
 - This is the method used to reinforce the mull windows (see Appendix A for additional details).
 - Use this information to choose the correct mullion assembly type table as described above.
- Using the illustrations for two-way, three-way and four-way mullion assemblies as guidance, determine the mullion span and the tributary load width (LW)
- The Mull Span to Load Width tables are applicable to vertical and horizontal mullions.
- The Mull Span to Load Width tables are applicable to two-way, three-way and four-way mullion assemblies.
- For mull assemblies that contain a vertical and horizontal mullion, determine load capacity for all mullions. The lower capacity governs the assemblies' overall mullion-based load capacity.
- Next compare the assemblies' mullion-based load capacity to that of the mull windows' load capacities. The lower capacity governs the assemblies' overall load capacity.

Appendix B presented the general installation methods. Page 14 of Appendix B shows a table of the required installation fasteners approved along with requirements for size, type, embedment, spacing and edge distance.

Required anchor quantities are summarized at the end of each mullion vs. load width table in Appendix D.

The format for that table follows.

Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	4	#10
	Steel Stud	SMS	6	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	3	#10
Block	Concrete	Tapcon	3	3/16"
	Masonry	Tapcon	4	3/16"
	Wood	WS/TS	4	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10

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See Appendix B, Page 14 for full Anchor Schedule Details

NR = Not Recommended

See Appendix A for Clip Types

Linear Interpolation between Mullion Spans and/or Load Width can be used.

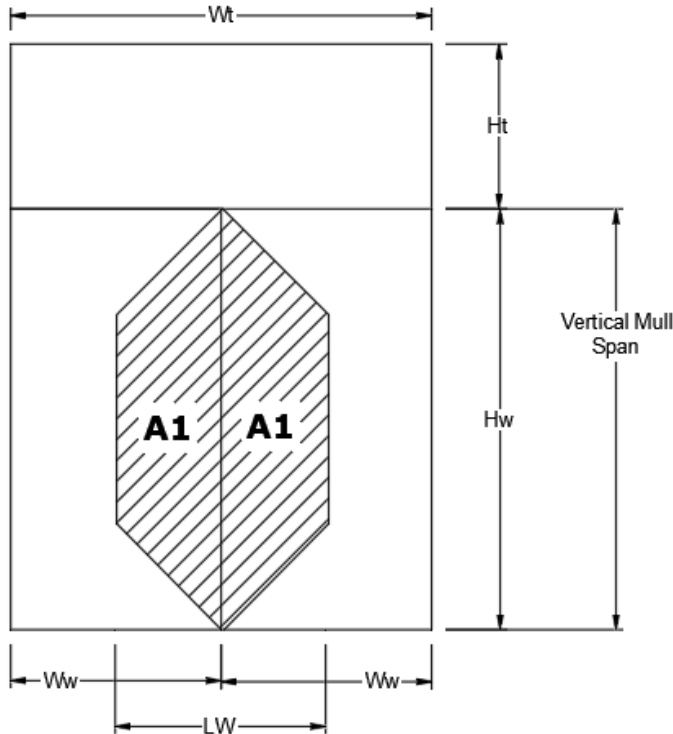
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Appendix C - Mull Span vs. Load Width Table Usage

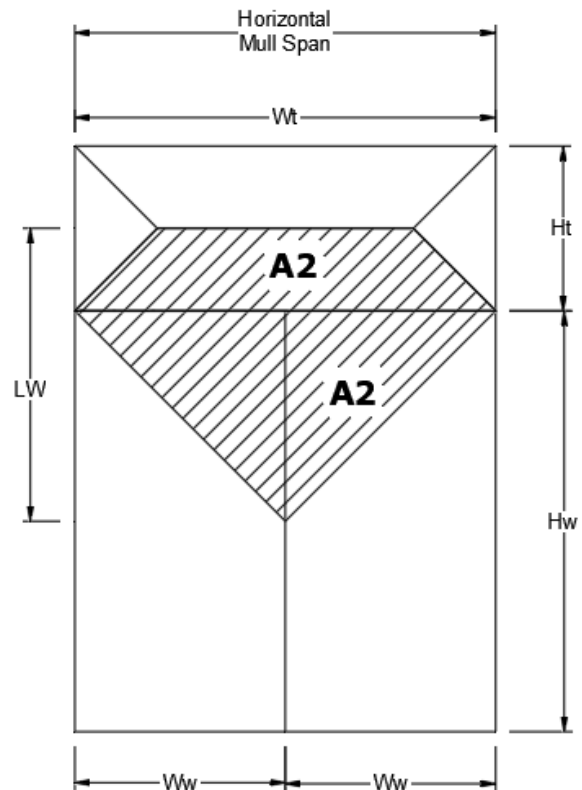
THREE-WAY MULLION VERTICAL MULL SPAN

A1 = WINDOW TRAPEZOIDAL TRIBUTARY AREA
Ww = WINDOW WIDTH
Hw = WINDOW HEIGHT
Wt = TRANSOM WIDTH
Ht = TRANSOM HEIGHT
LW = LOAD WIDTH
 $LW = [Ww \text{ (WINDOW)} + Ww \text{ (WINDOW)}]/2$



THREE-WAY MULLION HORIZONTAL MULL SPAN

A2 = TRANSOM TRAPEZOIDAL TRIBUTARY AREA
A2 = WINDOW TRAPEZOIDAL TRIBUTARY AREA
Ww = WINDOW WIDTH
Hw = WINDOW HEIGHT
Wt = TRANSOM WIDTH
Ht = TRANSOM HEIGHT
LW = LOAD WIDTH
 $LW = \{Ht \text{ (TRANSOM)} + Hw \text{ (LOWER WINDOWS)}\}/2$



The Vertical and Horizontal Mullions must be load rated separately and the lower of the vertical mullion or horizontal mullion shall governing the full mullied assembly.

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Appendix C - Mull Span vs. Load Width Table Usage

TWO-WAY MULLION VERTICAL MULL SPAN (APPLICABLE TO HORIZONTAL MULLION)

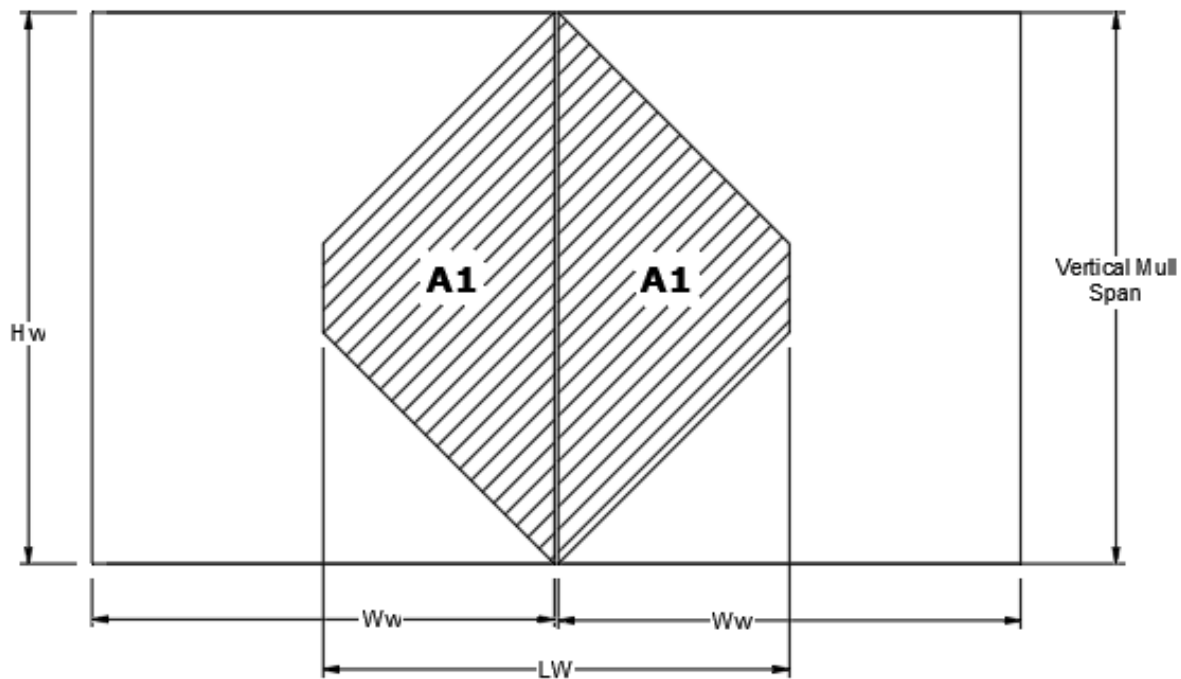
A1 = WINDOW TRAPEZOIDAL TRIBUTARY AREA

Ww = WINDOW WIDTH

Hw = WINDOW HEIGHT

LW = LOAD WIDTH

$LW = [Ww(WINDOW) + Ww(WINDOW)]/2$



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Appendix C - Mull Span vs. Load Width Table Usage

TWO-WAY MULLION HORIZONTAL MULL SPAN

A2 = TRANSOM TRAPEZOIDAL TRIBUTARY AREA

A2 = WINDOW TRAPEZOIDAL TRIBUTARY AREA

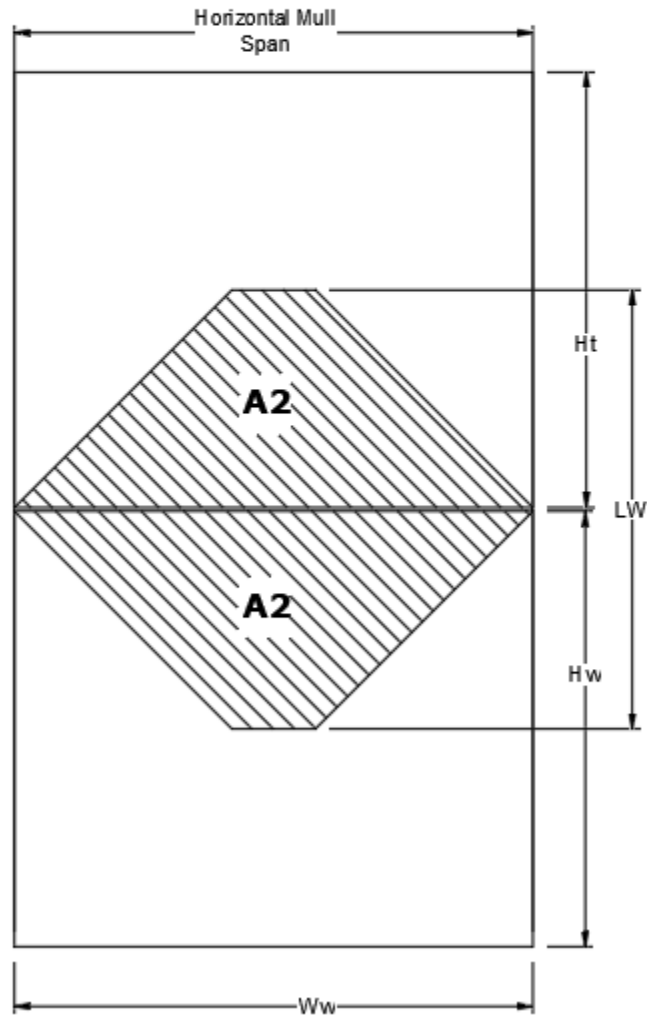
Ww = WINDOW AND TRANSOM WIDTH

Hw = WINDOW HEIGHT

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = [Ww(WINDOW) + Ww(WINDOW)]/2$



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Appendix C - Mull Span vs. Load Width Table Usage

FOUR-WAY MULLION **HORIZONTAL MULL SPAN**

A2 = TRANSOM TRAPEZOIDAL TRIBUTARY AREA

A2 = WINDOW TRAPEZOIDAL TRIBUTARY AREA

Ww = WINDOW WIDTH

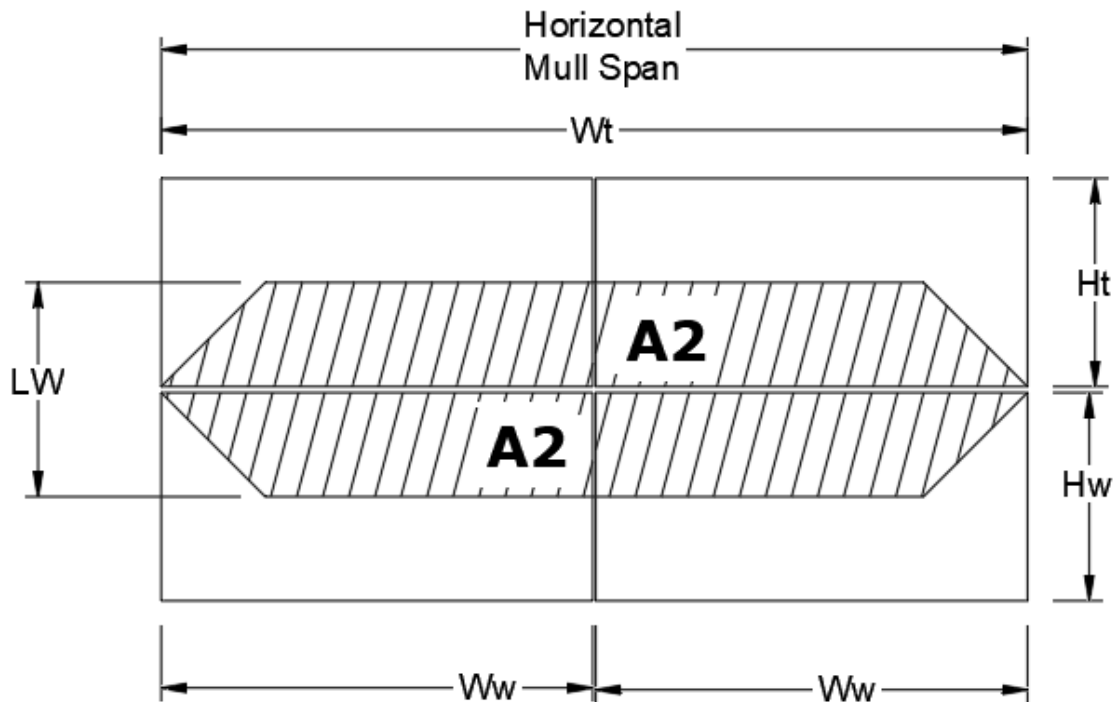
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = \{Ht \text{ (TRANSOM)} + Hw \text{ (LOWER WINDOWS)}\}/2$



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Appendix C - Mull Span vs. Load Width Table Usage

FOUR-WAY MULLION **VERTICAL MULL SPAN**

A1 = TRANSOM TRAPEZOIDAL TRIBUTARY AREA

A1 = WINDOW TRAPEZOIDAL TRIBUTARY AREA

Ww = WINDOW WIDTH

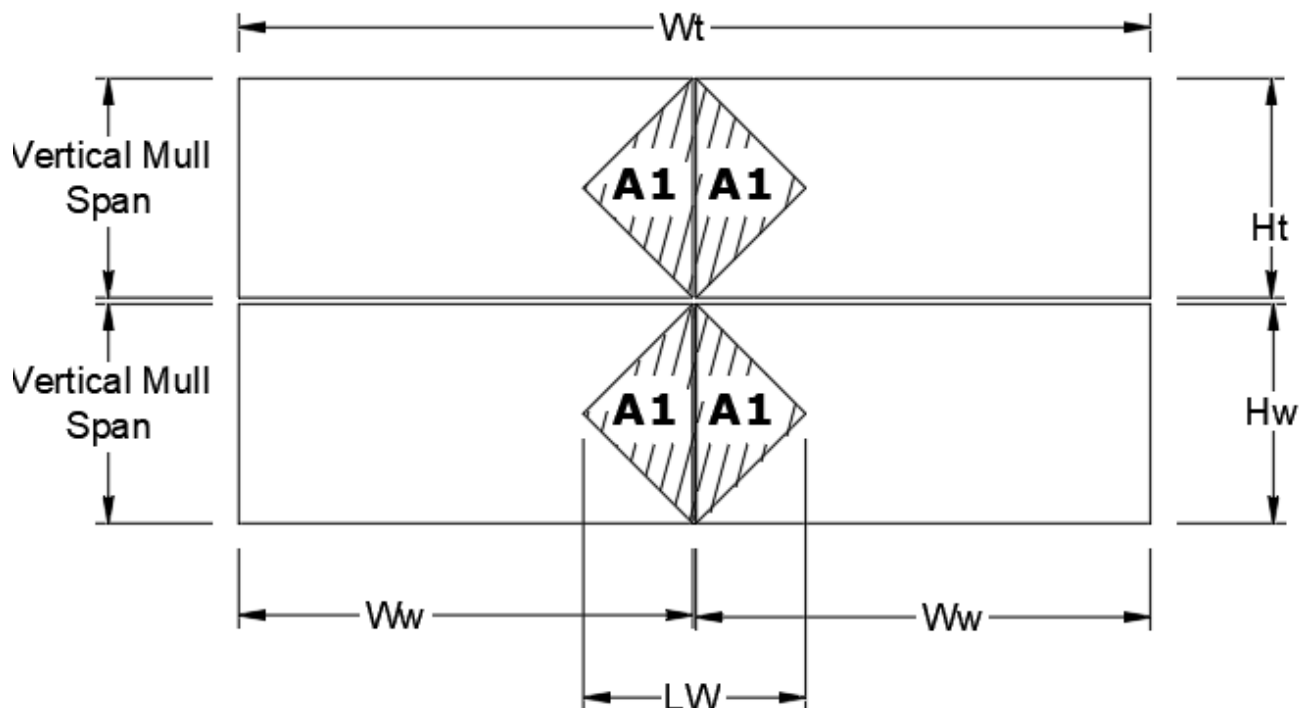
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = [Ww \text{ (WINDOW)} + Ww \text{ (WINDOW)}]/2$



The Vertical and Horizontal Mullions must be load rated separately and the lower of the vertical mullion or horizontal mullion shall governing the full mullied assembly.

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Appendix C - Mull Span vs. Load Width Table Usage

FOUR-WAY MULLION **VERTICAL MULL SPAN**

A1 = TRANSOM/WINDOW TRAPEZOIDAL TRIBUTARY AREA

Ww = WINDOW WIDTH

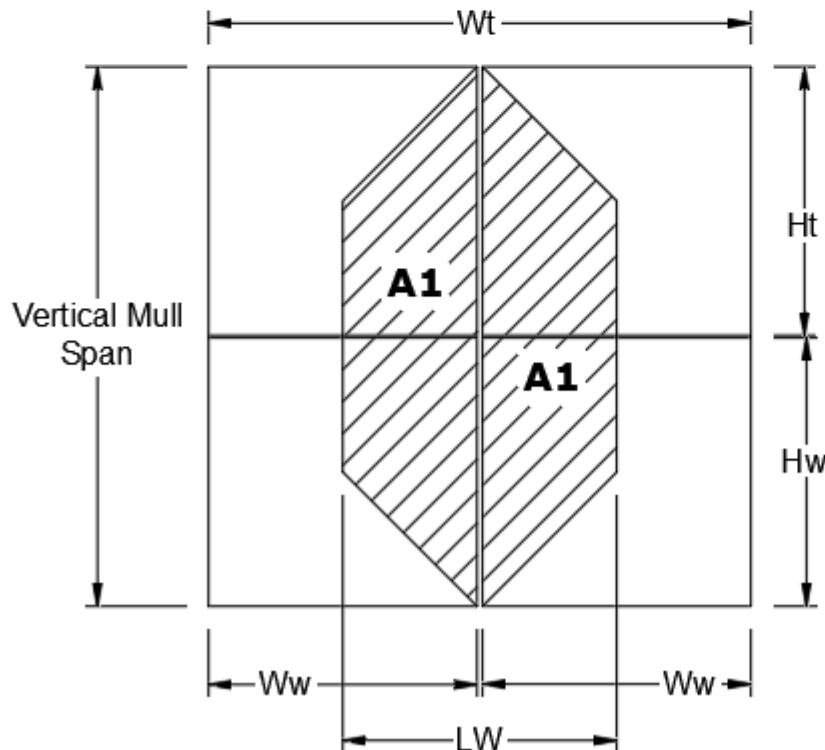
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = [Ww \text{ (LEFT WINDOW)} + Ww \text{ (RIGHT WINDOW)}]/2$



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Appendix C - Mull Span vs. Load Width Table Usage

FOUR-WAY MULLION HORIZONTAL MULL SPAN

A2 = TRANSOM TRAPEZOIDAL TRIBUTARY AREA

A2 = WINDOW TRAPEZOIDAL TRIBUTARY AREA

Ww = WINDOW WIDTH

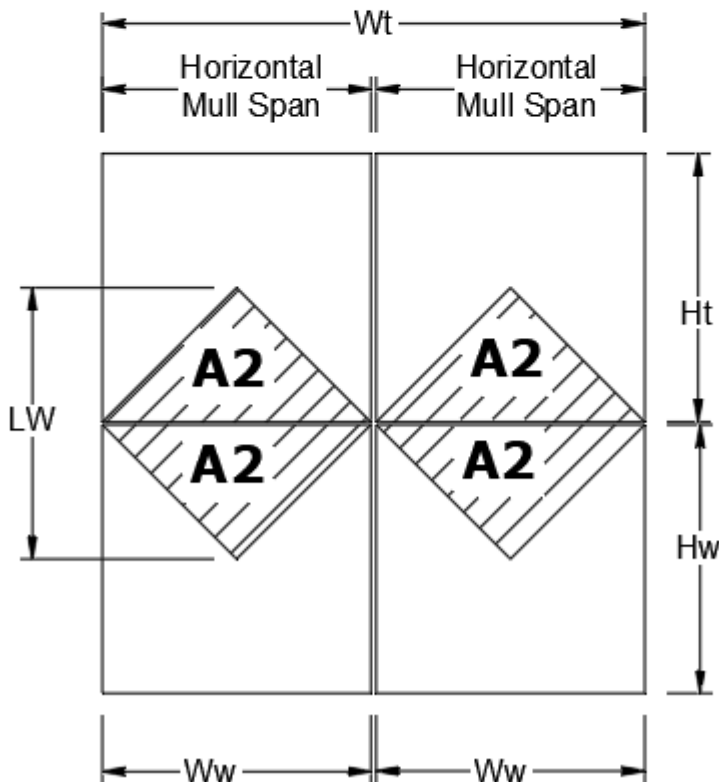
Hw = WINDOW HEIGHT

Wt = TRANSOM WIDTH

Ht = TRANSOM HEIGHT

LW = LOAD WIDTH

$LW = \{Ht \text{ (TRANSOM)} + Hw \text{ (LOWER WINDOW)}\}/2$



The Vertical and Horizontal Mullions must be load rated separately and the lower of the vertical mullion or horizontal mullion shall governing the full mullied assembly.

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Appendix D – Tight Mullion Span to Load Width Tables

Two, Three and Four - Way Mullion Configurations					
Mullion Type: Tight Mullion					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
24	24	50	42	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
30	24	50	48	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
36	24	50	54	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50

Two, Three and Four - Way Mullion Configurations					
Mullion Type: Tight Mullion					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
60	24	50	78	24	25
	30	46		30	20
	36	40		36	17
	42	37		42	15
	48	34		48	---
	54	33		54	---
	60	33		60	---
	66	33		66	---
	72	33		72	---
	78	33		78	---
	84	33		84	---
	90	33		90	---
66	24	41	84	24	20
	30	34		30	16
	36	30		36	---
	42	26		42	---
	48	24		48	---
	54	23		54	---
	60	22		60	---
	66	22		66	---
	72	22		72	---
	78	22		78	---
	84	22		84	---
	90	22		90	---
72	24	32	90	24	16
	30	26		30	---
	36	22		36	---
	42	20		42	---
	48	18		48	---
	54	17		54	---
	60	16		60	---
	66	16		66	---
	72	16		72	---
	78	16		78	---
	84	16		84	---
	90	16		90	---

Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	1	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
Block	1/8" Alum.	SMS	1	#10
	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	1	3/16"
	Wood	WS/TS	1	#10
	Steel Stud	SMS	1	#10

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Appendix D – ½” Mullion Span to Load Width Tables

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1/2" Mullion					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
24	24	50	42	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
30	24	50	48	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
36	24	50	54	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1/2" Mullion					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
60	24	50	78	24	50
	30	50		30	43
	36	50		36	36
	42	50		42	32
	48	50		48	29
	54	50		54	27
	60	50		60	26
	66	50		66	25
	72	50		72	24
	78	50		78	24
	84	50		84	24
	90	50		90	24
66	24	50	84	24	41
	30	50		30	34
	36	50		36	29
	42	50		42	25
	48	50		48	23
	54	49		54	21
	60	47		60	20
	66	47		66	19
	72	47		72	18
	78	47		78	18
	84	47		84	18
	90	47		90	18
72	24	50	90	24	34
	30	50		30	27
	36	47		36	23
	42	42		42	20
	48	38		48	18
	54	36		54	17
	60	34		60	16
	66	33		66	---
	72	33		72	---
	78	33		78	---
	84	33		84	---
	90	33		90	---

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1/2" Mullion					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
96	24	28	114	24	16
	30	22		30	---
	36	19		36	---
	42	17		42	---
	48	---		48	---
	54	---		54	---
	60	---		60	---
	66	---		66	---
	72	---		72	---
	78	---		78	---
	84	---		84	---
	90	---		90	---
102	24	23			
	30	19			
	36	16			
	42	---			
	48	---			
	54	---			
	60	---			
	66	---			
	72	---			
	78	---			
	84	---			
	90	---			
108	24	19			
	30	16			
	36	---			
	42	---			
	48	---			
	54	---			
	60	---			
	66	---			
	72	---			
	78	---			
	84	---			
	90	---			

Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
Block	1/8" Alum.	SMS	2	#10
	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	1	#10
	1/8" Steel	SMS	1	#10

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Appendix D – ½” Mullion with 1 Reinforcement Span to Load Width Tables

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1/2" Mullion + 1 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
24	24	50	42	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
	96	50		96	50
	108	50		108	50
30	24	50	48	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
	96	50		96	50
	108	50		108	50
36	24	50	54	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
	96	50		96	50
	108	50		108	50

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1/2" Mullion + 1 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
60	24	50	78	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	49
	84	50		84	49
	90	50		90	49
	96	50		96	49
	108	50		108	49
66	24	50	84	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	47
	54	50		54	43
	60	50		60	41
	66	50		66	39
	72	50		72	38
	78	50		78	37
	84	50		84	37
	90	50		90	37
	96	50		96	37
	108	50		108	37
72	24	50	90	24	50
	30	50		30	50
	36	50		36	47
	42	50		42	42
	48	50		48	38
	54	50		54	34
	60	50		60	32
	66	50		66	30
	72	50		72	29
	78	50		78	28
	84	50		84	28
	90	50		90	28
	96	50		96	28
	108	50		108	28

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1/2" Mullion + 1 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
96	24	50	114	24	33
	30	46		30	27
	36	39		36	23
	42	34		42	20
	48	30		48	18
	54	28		54	16
	60	26		60	---
	66	24		66	---
	72	23		72	---
	78	22		78	---
	84	22		84	---
	90	22		90	---
	96	21		96	---
	108	21		108	---
102	24	47	120	24	29
	30	38		30	23
	36	32		36	19
	42	28		42	17
	48	25		48	15
	54	23		54	---
	60	21		60	---
	66	20		66	---
	72	19		72	---
	78	18		78	---
	84	18		84	---
	90	17		90	---
	96	17		96	---
	108	17		108	---
108	24	39	126	24	25
	30	32		30	20
	36	27		36	17
	42	23		42	---
	48	21		48	---
	54	19		54	---
	60	18		60	---
	66	16		66	---
	72	16		72	---
	78	---		78	---
	84	---		84	---
	90	---		90	---
	96	---		96	---
	108	---		108	---

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1/2" Mullion + 1 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
132	24	21	144	24	16
	30	17		30	---
	36	---		36	---
	42	---		42	---
	48	---		48	---
	54	---		54	---
	60	---		60	---
	66	---		66	---
	72	---		72	---
	78	---		78	---
	84	---		84	---
	90	---		90	---
	96	---		96	---
	108	---		108	---
138	24	19			
	30	15			
	36	---			
	42	---			
	48	---			
	54	---			
	60	---			
	66	---			
	72	---			
	78	---			
	84	---			
	90	---			
	96	---			
	108	---			

Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
Block	1/8" Alum.	SMS	2	#10
	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10

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Appendix D – 1” Mullion Span to Load Width Tables

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
24	24	50	42	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
30	90	50	48	90	50
	96	50		96	50
	108	50		108	50
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
36	72	50	54	72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
	96	50		96	50
	108	50		108	50
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
60	24	50	78	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	47
	54	50		54	44
	60	50		60	42
	66	50		66	40
	72	50		72	39
	78	50		78	39
	84	50		84	39
66	90	50	84	90	39
	96	50		96	39
	108	50		108	39
	24	50		24	50
	30	50		30	50
	36	50		36	46
	42	50		42	41
	48	50		48	37
	54	50		54	34
	60	50		60	32
	66	50		66	31
72	72	50	90	72	30
	78	50		78	29
	84	50		84	29
	90	50		90	29
	96	50		96	29
	108	50		108	29
	24	50		24	50
	30	50		30	44
	36	50		36	37
	42	50		42	33
	48	50		48	30

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
96	24	44	114	24	26
	30	36		30	21
	36	31		36	18
	42	27		42	16
	48	24		48	---
	54	22		54	---
	60	20		60	---
	66	19		66	---
	72	18		72	---
	78	18		78	---
	84	17		84	---
102	90	17	120	90	---
	96	17		96	---
	108	17		108	---
	24	37		24	23
	30	30		30	18
	36	25		36	15
	42	22		42	---
	48	20		48	---
	54	18		54	---
	60	17		60	---
	66	16		66	---
108	72	---	126	72	---
	78	---		78	---
	84	---		84	---
	90	---		90	---
	96	---		96	---
	108	---		108	---
	24	31		24	19
	30	25		30	16
	36	21		36	---
	42	18		42	---
	48	16		48	---

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
132	24	17	138	24	15
	30	---		30	---
	36	---		36	---
	42	---		42	---
	48	---		48	---
	54	---		54	---
	60	---		60	---
	66	---		66	---
	72	---		72	---
	78	---		78	---
	84	---		84	---
138	90	---		90	---
	96	---		96	---
	108	---		108	---

Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	1	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	3	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	2	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	1	#10
	1/8" Alum.	SMS	1	#10

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Appendix D – 1" Mullion with 1 Reinforcement Span to Load Width Tables

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion + 1 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
24	24	50	42	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
30	90	50	48	90	50
	96	50		96	50
	108	50		108	50
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
36	72	50	54	72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
	96	50		96	50
	108	50		108	50
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion + 1 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
60	24	50	78	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
66	90	50	84	90	50
	96	50		96	50
	108	50		108	50
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
72	72	50	90	72	49
	78	50		78	48
	84	50		84	48
	90	50		90	48
	96	50		96	48
	108	50		108	48
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	49

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion + 1 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
96	24	50	114	24	43
	30	50		30	35
	36	50		36	30
	42	44		42	26
	48	40		48	23
	54	36		54	21
	60	34		60	19
	66	32		66	18
	72	30		72	17
	78	29		78	16
	84	28		84	15
102	90	28	120	90	---
	96	28		96	---
	108	28		108	---
	24	50		24	37
	30	49		30	30
	36	42		36	25
	42	36		42	22
	48	33		48	20
	54	30		54	18
	60	28		60	16
	66	26		66	15
108	72	25	126	72	---
	78	24		78	---
	84	23		84	---
	90	22		90	---
	96	22		96	---
	108	22		108	---
	24	50		24	32
	30	41		30	26
	36	35		36	22
	42	31		42	19
	48	27		48	17

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion + 1 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
132	24	28	144	24	21
	30	22		30	17
	36	19		36	---
	42	16		42	---
	48	---		48	---
	54	---		54	---
	60	---		60	---
	66	---		66	---
	72	---		72	---
	78	---		78	---
	84	---		84	---
138	90	---	150	90	---
	96	---		96	---
	108	---		108	---
	24	24		24	19
	30	20		30	15
	36	16		36	---
	42	---		42	---
	48	---		48	---
	54	---		54	---
	60	---		60	---
	66	---		66	---

Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	4	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	3	3/16"
	Wood	WS/TS	2	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10

Product Evaluation Report

Appendix D – 1” Mullion with 2 Reinforcements Span to Load Width Tables

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion + 2 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
24	24	50	42	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
30	96	50	48	96	50
	108	50		108	50
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
36	84	50	54	84	50
	90	50		90	50
	96	50		96	50
	108	50		108	50
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion + 2 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
60	24	50	78	24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
	84	50		84	50
	90	50		90	50
66	96	50	84	96	50
	108	50		108	50
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50
	72	50		72	50
	78	50		78	50
72	84	50	90	84	50
	90	50		90	50
	96	50		96	50
	108	50		108	50
	24	50		24	50
	30	50		30	50
	36	50		36	50
	42	50		42	50
	48	50		48	50
	54	50		54	50
	60	50		60	50
	66	50		66	50

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion + 2 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
96	24	50	114	24	50
	30	50		30	49
	36	50		36	41
	42	50		42	36
	48	50		48	32
	54	50		54	29
	60	47		60	27
	66	44		66	25
	72	42		72	23
	78	41		78	22
	84	40		84	21
	90	39		90	21
102	96	39	120	96	20
	108	39		108	20
	24	50		24	50
	30	50		30	42
	36	50		36	35
	42	50		42	31
	48	45		48	27
	54	41		54	25
	60	38		60	23
	66	36		66	21
	72	34		72	20
	78	33		78	19
108	84	32	126	84	18
	90	31		90	17
	96	31		96	17
	108	31		108	16
	24	50		24	45
	30	50		30	36
	36	49		36	30
	42	43		42	26
	48	38		48	23
	54	34		54	21
	60	32		60	19
	66	30		66	18

Two, Three and Four - Way Mullion Configurations					
Mullion Type: 1" Mullion + 2 Reinforcement					
MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)	MULL SPAN (IN)	LOAD WIDTH (IN)	DP (PSF)
132	24	39	144	24	30
	30	31		30	24
	36	26		36	20
	42	23		42	17
	48	20		48	15
	54	18		54	---
	60	17		60	---
	66	15		66	---
	72	---		72	---
	78	---		78	---
	84	---		84	---
	90	---		90	---
138	96	---	150	96	---
	108	---		108	---
	24	34		24	26
	30	27		30	21
	36	23		36	18
	42	20		42	15
	48	18		48	---
	54	16		54	---
	60	---		60	---
	66	---		66	---
	72	---		72	---
	78	---		78	---

Clip Type	Substrate	Type	Min. Qty.	Size
Fin	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	NR	3/16"
	Wood	WS/TS	3	#10
	Steel Stud	SMS	4	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	3	#10
Block	Concrete	Tapcon	2	3/16"
	Masonry	Tapcon	3	3/16"
	Wood	WS/TS	3	#10
	Steel Stud	SMS	2	#10
	1/8" Steel	SMS	2	#10
	1/8" Alum.	SMS	2	#10