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Hung Window
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PRODUCT APPROVAL SUPPORTING CALCULATIONS

Series/Model 3540 Triple Single Hung Window

REPORT No.: 30566.01-107-16

RENDERED TO: MI Windows and Doors
702 West Market Street
Gratz, Pennsylvania 17030

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REPORT DATE: 4/16/2025

This item has been digitally signed and sealed
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SCOPE:

Molimo, LLC was contracted by MI Windows and Doors to evaluate alternate installation methods for their 3540 Triple Single Hung Window window. The evaluation is based on physical testing and product certifications.

Reference standards utilized in this project include:

Florida Building Code, Building, 8th Edition (2023). International Code Council, 2023.

ANSI/AWCNDS-2018 National Design Specification (NDS) for Wood Construction. American Wood Council, 2018.

AISI S100-16 North American Specification for the Design of Cold-Formed Steel Structural Members, 2016. American Iron and Steel Institute, 2016.

2020 Aluminum Design Manual. The Aluminum Association, Inc. 2020.

ICC-ES Report ESR-1976 ITW Buildex TEKS Self-Drilling Fasteners. ICC Evaluation Service. 07/2016.

The anchorage analysis presented herein do not address the water resistance, water penetration, or air infiltration performance of the installation method or the installed product. In addition, the analyses rely on the assumption that the building substrate is capable of withstanding the incurred loads.



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Certification of Independence

In accordance with Rule 61G20-3 Florida Administrative Code, Molimo, LLC hereby certifies the following:

- Molimo, LLC does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products tested or labeled by the agency.
- Molimo LLC s is not owned, operated or controlled by any company manufacturing or distributing products it tests or labels.
- Michael D. Stremmel, P.E. does not have nor will acquire, a financial interest in any company manufacturing or distributing products for which the reports are being issued.
- Michael D. Stremmel, P.E does not have, nor will acquire, a financial interest in any other entity involved in the approval process of the product.

ANALYSES:

Summary of Test Results

Table 1 summarizes the various 3540 Triple Single Hung Window products and their corresponding performance levels which have been established by testing of product certification.

The products considered in this report satisfy the requirements of the *Florida Building Code* for the overall sizes and design pressures of the following product certifications and their installation methods presented in this report.

Table 1: Summary of Product Certifications and Limitations of Use

Series/Model	Test Report Number	Product Certification	Size (W x H)	Performance
3540	G1596.01-109-47 (Rev. 0, 8/25/16)	15747	108" x 84"	±35 psf

Testing documented in Table 1 was conducted by Intertek of York, Pennsylvania (Florida Department of Business & Professional Regulation Test Lab No. TST1558, IAS Certificate of Accreditation TL-144).

ANALYSES: (Continued)

As-Tested Installation Analysis

For air/water/structural testing, the test specimen was secured to a pine wood test buck with #6 x 1-5/8" screws through the integral PVC nail fin was tested. The as tested installation method is evaluated on Page 7 and the established design capacity is summarized in Table 2.

Table 2: As-tested Anchorage Design Capacities

Test Specimen Installation Method	Connection Details	Capacity
Mounting Fin Install	<u>Head, Sill, and Jamb</u> #6 x 1-5/8 Drywall screws Located 3" from each corner, and spaced 8" on center through the nail fin into the wood buck	44.1 lb

The capacities presented in Table 2 will be used to prove acceptable alternate anchors and substrates for the windows.

Alternate Anchorages

Calculations on Page 8 determine the design capacity of alternate mounting fin installation anchorages for the window. The alternate anchorage capacities are summarized in Table 3.

Table 3: Alternate Anchorage Capacities for Mounting Fin Installations

Substrate	Anchor	Capacity	Comments
18 Ga. Steel Stud	#10-16 TEKS Screw	104 lb	1. 33 KSI yield strength stud 2. Full penetration +3 threads 3. Limited by pullout capacity

ANALYSES: (Continued)

Anchorage Requirements

It must be determined the anchorages are not overloaded for the approved window size and design pressures. Calculations presented on Page 9 shows the following:

1. Mounting Fin Installation Method: The as-tested spacing is adequate for the minimum anchor capacity reported in this report when the windows are subjected to the maximum design pressures of the products at their approved maximum sizes.

Based on the calculations, Table 4 shows the maximum anchor spacing for each installation method. The anchor spacings shown in the following table apply to all substrates and anchor types.

Table 4: Anchorage Spacing Requirements

Installation Method	Maximum Anchor Spacing
Mounting Fin	3" from each corner, and spaced a maximum of 8" on center, through the mounting fin into the building substrate

As-Tested Installation – Nail Fin to Wood

Anchor: #6 x 1-5/8" Wood Screw

Details: Through the PVC Nail Fin

Substrate: SPF wood test buck (G = 0.42 min.)

Wood Screw Capacity (Tension)

$W = 1.6(1.50" - 0.062")(69 \text{ lb/in})$ (NDS, Table 12.2B)

$W = \underline{\underline{159 \text{ lb}}}$

Pull-over of Wood Screw

Pull-over of the wood screw is validated by the test

As-tested spacing: 8" on center

As-tested Anchor head size: 0.279"

Anchor Placement: 3" from corner; 8" on center

Anchor Quantities:

Jambs: 11 per Jamb

Head: 14

Sill: 14

Total: 50

Load to Anchors: $(108")(84")(35 \text{ psf} / 144) = 2,205 \text{ lb}$

Individual Anchor Load: $(2,205 \text{ lb}) / (50 \text{ anchors}) = 44.1 \text{ lb} (< \text{withdrawal capacity})$

Design Capacity of the Connection = 44.1 lb



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Alternate Installation – Nail Fin to Steel Stud

Anchor: #10-16 TEKS Screw

Details: Through the PVC Nail Fin

Substrate: 18 ga steel stud (33 ksi, 0.043" thick)

Wood Screw Capacity (Tension)

$$P_{ss} / \Omega = \underline{885 \text{ lb}} \quad (\text{ESR-1976})$$

Pull-over of #10-16 TEKS Screw

$$\text{Anchor head size} = 0.365" > 0.330" \quad (\text{maintain as tested spacing})$$

Pull-out of #10-16 TEKS Screw

$$P_{\text{not}} = 0.85 t_c d F_{tu} = 0.85(0.043")(0.190")(45,000 \text{ psi}) = 312 \text{ lb}$$

$$P_{\text{allow}} = 312 \text{ lb} / 3.0 = \underline{104 \text{ lb}}$$

Design Capacity of the Connection = 104 lb



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Alternate Requirements

Series/Model: 3540 Triple Single Hung
Test Unit Size: 108" x 84"
Design Pressure: ± 35 psf

Mounting Fin Installation Method

Anchor Placement: 3" from corners and 8" on center
Anchor Quantities: Head / Sill = 14 per
Jambs = 11 per
Total = 50

Load to the Anchors = $(108")(84")(35 \text{ psf} / 144) = 2,205 \text{ lb}$

Individual Anchor Load = $2,205 \text{ lb} / 50 \text{ anchors} = 44.1 \text{ lb}$

Least Anchor Capacity = 104 lb (Steel Stud) > 44.1 lb

Tested Anchor Spacing Governs



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Revision Log

Rev. #	Date	Page(s)	Revision(s)
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