

## Laboratory Air Penetration Testing

### INTRODUCTION

The purpose of this testing was to evaluate the potential for air penetration at the interface of the Prebuck window and door buck with a concrete wall over an extended and extreme exposure period. The exposure period was set up to challenge the stability and durability of the Prebuck buck assembly when used in combination with poured-in-place concrete walls.

The test methods used, and wall assembly will be compared to those previously generated and detailed by ICF Wall Testing and Modeling – Lab Testing Report prepared by RDH Building Engineering Ltd. (RDH) (4975.10 ICF Phase 2, (2013).

### TEST METHODOLOGY

Testing of a Prebuck window buck as installed in an ICF wall, with a six-inch concrete core, was performed at the Tremco CPG Building Science Laboratory in Cleveland, Ohio. This test facility can evaluate assemblies that are 20'x16' (6.10 m x 4.88 m), utilizing multi-directional blowers, Labview controller software, and a water recycling system. This facility performs air leakage, water penetration resistance, and structural testing. The equipment is periodically calibrated by a 3<sup>rd</sup> party for accuracy.

The objective of this testing was to demonstrate that the Prebuck bucking system performs as good or better than traditional walls when exposed to extended and extreme weathering. The testing represented exposed ICF without additional flashing, weather-resistant barriers or finishes installed.

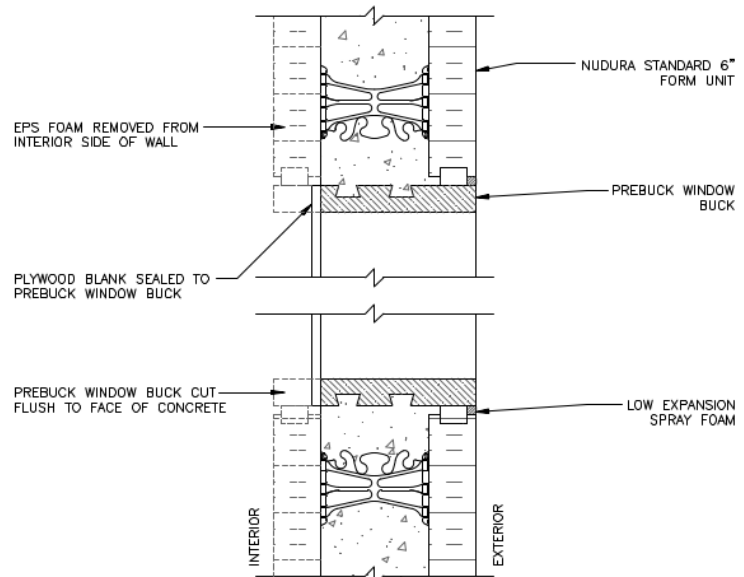
### TEST WALL ASSEMBLY CONSTRUCTION

The 8' x 4' (2.44 m x 1.22 m) wall was constructed with Nudura ICF and included a 35" x 35" (889 mm x 889 mm) Prebuck window buck. A plywood blank was used to seal the system and act as the "window" during the water test. The Prebuck Window and Door buck is an engineered solution for punched openings. Produced with 1 1/2" (38 mm) thick, treated LSL with a double keyway to allow the buck frame to integrate directly with the concrete when poured.

Diagram 1: 8' x 4' (2.4 m x 1.2 m) Nudura Prebuck Assembly



Diagram 2: Prebuck design detail shown as tested below



Note: The inside face of the EPS foam was removed prior to the test to ensure a clear visual result could be verified.

## TEST PROTOCOL

The air tightness of the assembly was evaluated according to ASTM E283, *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*.

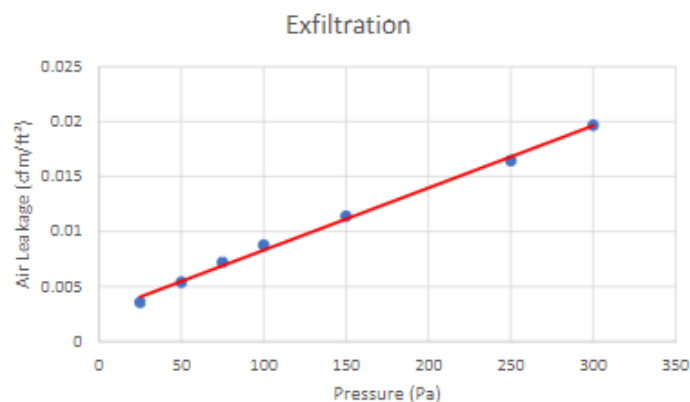
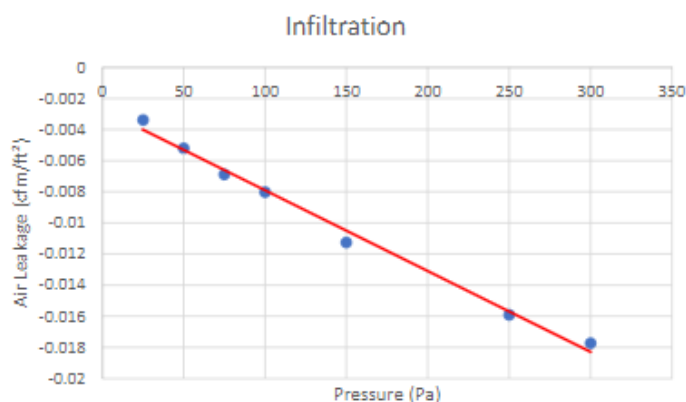
## TEST RESULTS

Testing was conducted on April 19<sup>th</sup> and 20<sup>th</sup>, 2023. The assemblies were built in the fall of 2022 and left outside laying down horizontally to be weathered throughout the winter and early spring. The purpose of this was to maximize exposure during inclement weather and to provide a weathered assembly for the evaluation. This would represent the worst-case scenario for exposure as it was essentially a bathtub holding water throughout the freeze-thaw cycles of a Cleveland winter.

### 4.1 Air Leakage

Industry recommendations have set a maximum air leakage rate for wall air barrier assemblies at 0.04 CFM/ft<sup>2</sup> at a pressure difference of 1.57 psf (0.2 L/(sm<sup>2</sup>) at a pressure difference of 75 Pa). The air leakage was evaluated in accordance with ASTM E283 and exceeded this requirement not only at 1.57 psf (75 Pa) but also at an extended pressure differential of 6.24 psf (300 Pa).

#### 4.1.2 Air Leakage Test Results



## CONCLUSION

The Prebuck Window buck assembly installed in an ICF wall exceeded the industry requirements for air leakage of the assemblies. The extended and extreme exposure of the Prebuck assembly provided additional confidence in not only the performance of this critical interface but also when exposed during the construction cycle and throughout the life of the structure. Other tests associated with Prebuck can be found at [www.prebuckproducts.com](http://www.prebuckproducts.com).

We welcome any inquiries into this testing and would appreciate any feedback on additional testing that you would like to see performed. Additionally, we extend the ability to evaluate your specific assembly or project-specific assembly at the Tremco Building Science lab so that we can incorporate your window, façade anchors or adhered veneer, below grade to wall, and roof to wall connections.

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