

# AIR INFILTRATION TESTING

## Prepared for

Norbord

## Prepared by

NAHB Research Center  
400 Prince George's Blvd  
Upper Marlboro, MD 20774  
[www.nahbrc.com](http://www.nahbrc.com)

September 21, 2009

**Report # 4109-02\_08172009**



*America's Housing Technology and Information Resource*

## Table of Contents

Purpose and Scope.....	1
Test Plan.....	1
Wall Configuration .....	1
Test Equipment.....	2
Results.....	3
Discussion and Conclusions .....	3
References.....	3
Disclaimer.....	3

## List of Figures

Figure 1: Test Wall Configuration.....	1
Figure 2: Second Wall Configuration.....	2

## List of Tables

Table 1: Test Results .....	3
-----------------------------	---

## Purpose and Scope

Norbord contracted with the NAHB Research Center to conduct a series of air infiltration tests to compare the effect of sheathing with typical 4'x8' OSB panels to Norbord TallWall panels.

## Test Plan

### *Wall Configuration*

Each test wall measured 8'- 8" high by 10' long and was constructed in a conventional stick framing method using 2x4 SPF framing at 16" on center and with a single bottom plate and a double top plate. One interior electrical box was included and wiring was run across all the stud bays at the box height. The wall was insulated with inset stapled R-13 fiberglass batts. The interior side was covered with ½" drywall and the seams were taped with one coat of tape joint compound.

For the first test, the wall was sheathed with 4' x 8' 7/16" OSB panels laid horizontally. The panels were gapped on all edges with a 1/8" gap per manufacturer's installation instructions. Horizontal blocking was not installed. This resulted in two 1/8" horizontal gaps running across the test wall.

For the testing, the drywall joints to the perimeter studs and top plate were caulked along the edge to simulate the situation where the wall would continue beyond the extent of the test wall as well as having a taped drywall seam between the wall and the ceiling at the top. The joint at the bottom plate was not caulked as typically there would not be a particularly air tight joint at the bottom plate/drywall interface.

The first test wall configuration (prior to insulation and drywall) is shown in Figure 1. (Note horizontal seams near mid-points and top.)



Figure 1: Test Wall Configuration

The second test wall was built with Norbord TallWall panels which were cut to 8'-8" in length and fastened to the studs in a vertical orientation. The panels were gapped 1/8" according to the manufacturer's instructions but the extra length allowed all panel edges to be on studs and span from the bottom of the bottom plate to the top of the top plate.

The second test wall configuration (prior to insulation and drywall) is shown in Figure 2.



**Figure 2: Second Wall Configuration**

### ***Test Equipment***

The air infiltration testing was conducted in the NAHB Research Center's E283/E331 chamber measuring approximately 8'-6" high by 10' long by 3' deep. The chamber is pressurized using a blower. The pressure differential is measured by inclined water manometers and the flow rate is measured through calibrated orifice plates.

### ***Test Protocol***

Air infiltration testing was conducted generally according to ASTM E283 "Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen". After the test wall was initially installed in the chamber the test wall was covered with a 6 mil poly film and the air infiltration rate was measured to determine the system leakage. Then the poly film was cut away and the air infiltration rate was measured for the base wall. Air infiltration was measured with a 0.1" H<sub>2</sub>O (25 Pascals), 0.2" H<sub>2</sub>O (50 Pascals) and a 0.3" H<sub>2</sub>O (75 Pascals) pressure difference between the inside and outside of the test wall. The flow direction was from the exterior to the interior of the wall system.

After the base wall was tested at each of the three test pressure differentials, house wrap was applied using 1" cap nails per the manufacturer's instructions. The house wrap was installed in

two pieces with one vertical seam. The air infiltration rate was re-tested to measure the effect of the house wrap. The vertical seam was then sealed with seam tape and the test was repeated.

## Results

The results of the testing are summarized in Table 1. The values are SCFM after adjusting for chamber loss, temperature, and barometric pressure.

**Table 1: Test Results**

Test Wall	At 0.1" H <sub>2</sub> O		At 0.2" H <sub>2</sub> O		At 0.3" H <sub>2</sub> O	
	4 x 8 panels	TallWall Panels	4 x 8 panels	TallWall Panels	4 x 8 panels	TallWall Panels
Base Wall	3.72	2.30	6.31	3.32	8.50	4.85
With House Wrap	2.49	1.76	3.00	2.56	3.86	3.03
With House Wrap Taped	0.48	0.21	0.85	0.31	1.24	0.46

## Discussion and Conclusions

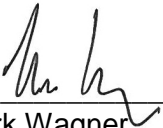
Walls over 8' tall built with TallWall panels showed substantial reduction in air infiltration compared to walls sheathed with conventional 4' x 8' OSB panels installed horizontally without blocking. The installation and sealing of house wrap also significantly reduced air infiltration for both types of construction. The test wall contained one vertical house wrap seam in the 10' length of wall. Actual construction seams may be further apart than 10'. Also, actual construction provides for many sources of air infiltration including windows, doors, band joist, and penetrations. This report does not address any of these sources of air infiltration.

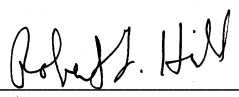
## References

ASTM International. ASTM E283 "Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen"

## Disclaimer

The NAHB Research Center is accredited by IAS as a test lab (TL-105). This report shall not be used to claim product endorsement by the NAHB Research Center, Inc., or by any of its accrediting agencies.

Testing by:   
 Mark Wagner

Review by:   
 Robert L. Hill  
 Director of Laboratory & Certification Programs