

Air Sealing vs. Water Tightness

INTRODUCTION

Low air infiltration is one of the primary performance features of SIPs (Structural Insulated Panels). While this claim has been confirmed by dozens of laboratory and real-world tests, water can leak through panel joints during construction. Clearly, water flow through a panel joint means air can flow through the same path. This bulletin addresses the obvious conflict between SIP's low air leakage claims and visible water leakage.

TERMINOLOGY

Within much of the construction industry, including Foard Panel, "air sealing" has a particular meaning. Rather than meaning something has been sealed air tight, our trade uses "air sealing" as the name of the process of reducing air infiltration. More specifically to SIPs, "air sealing" is the term for the process of making panel joints highly resistant to air leakage.

"Air sealing" should be used similarly to way our trade uses the term "vapor barrier". Most materials sold a "vapor barriers" have published vapor permeances that are much larger than zero. The term "vapor control layer" is a more accurate term in the same way "air infiltration control" is more accurate than "air sealing".

WEATHER & CONSTRUCTION

Rain during construction is not rare in New England. Thousands of Foard's SIPs have been rained on before the roofing was installed. SIPs aren't intended to be roofing, nor are panel joints intended to be water tight. Visible water leakage is often seen through SIP roof joinery, particularly at valleys and transitions.

So long as the SIPs are roofed within a reasonable period of time (Foard recommends within 30 days), the SIP's structural integrity and dimensional stability aren't at risk.

WATER LEAKAGE & AIR LEAKAGE

Drawing a direct connection between rainwater infiltration and future air infiltration isn't as linear a process as it may first appear. First, the difference in density between water and indoor air is vast when compared to the difference in density between warm and cold air. Being that it's the density difference that drives air or water through SIP joints, we have to respect that the motive force (gravity and density difference) driving the water through the joints is much larger than the motive force that causes air infiltration.

Second, the volume of water that leaks in during construction may look large, but, when measured by the same method as air infiltration, it's tiny. A building's air infiltration is frequently measured in CFM (cubic feet per minute) or ACH (air changes per hour). Even if 100 gallons of water have leaked through the panel joints from an overnight rainfall, (13 cubic feet of water over 8 hours or more), this works out to a flow rate of a small fraction of a CFM.

In order to look at the water leakage rate when compared to the buildings total volume, similar to ACH, we have to imagine how long it would take for a volume of water equal to the building's entire interior volume. An air infiltration rate of 0.1 ACH under normal operating conditions is considered quite good. A water leak large enough to fill 1/10 of a building's total volume within one hour is a higher flow rate than the largest fire hose.

CONCLUSION

Rain water that is visibly leaking through SIP joints can look distressing, but, except in the most extreme cases, this does not indicate an issue with the "air sealing". To gauge the size of the air leak, consider that 1 CFM is roughly equal to 450 gallons per hour.

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