

# ZbD: Notes from the Field

## Insights in High-Performance Construction



IS0016 // November, 2017

## The Aspiring Vapor Barrier – Part 2

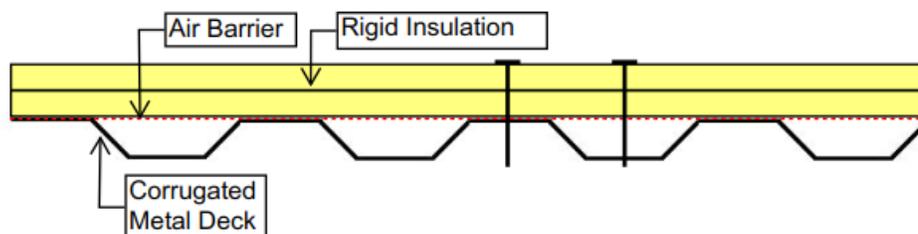
By: Jon Haehnel

Last month I made the case that a vapor barrier on a commercial flat roof *should* also be an air barrier. That case hinged on 3 points: increased energy efficiency, increased resistance to condensation, and increased resistance to wind uplift.

This time, let's talk about *how* the vapor barrier can be transformed into an air/vapor barrier.

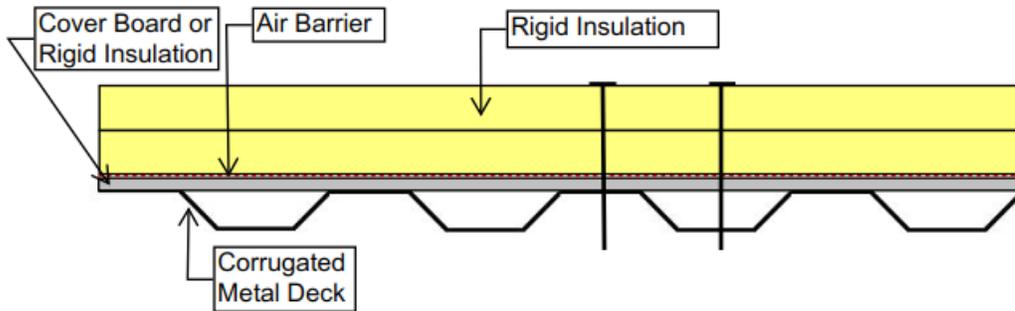
First and foremost, "sandwich" your vapor barrier. Air barriers do not do well unsupported over voids. The days of a poly barrier stapled to the underside of trusses should be over. Loose, floppy membrane does not hold up as a continuous barrier. Gravity and air pressure slowly work on unsupported films until they open up. Less conspicuous but still unsupported is loose poly or other sheet goods over a corrugated metal deck. At every "down" corrugation the poly is unsupported. My preference for both adhered and loose vapor barriers is to pin them between two flat layers or "sandwich" them. The vapor barrier can be pinned between two layers of polyisocyanurate insulation or between a coverboard over and polyiso insulation or between a concrete deck and polyiso. How does "sandwiching" help? Simply put, it isolates any holes poked through the air/vapor barrier.

Look at this example of a screws installed down to the deck. The screw on the left is through the air/vapor barrier, but the barrier is sandwiched. The air/vapor barrier has a hole in it because of the screw, but the hole has nowhere to connect; it's isolated. The screw on the right also creates a hole, but this hole connects to an open channel in the flute below that can run for hundreds of linear feet. That hole creates an air leakage pathway.



Now, I know that roofing screws are only supposed to affix to the "up" corrugations but in the real world, misses happen all the time. Look what happens if the same air/vapor barrier material is sandwiched continuously between two flat surfaces. No matter the location of the screws, the holes made by them are isolated.

[Continued on pg. 2](#)



This concept of isolating the holes through the air barrier through “sandwiching” applies not only to screws but to larger holes made by ducts, pipes, conduit, support piers – anything. The only caution is, the vapor barrier should be sandwiched predominantly towards the interior side of the building. It should be closer to the roof deck, not the roof membrane.

Next, make sure the roof vapor barrier makes direct contact to, and is sealed to, the air barrier on the exterior walls. Mind the tricky situations like parapet walls or roof overhangs. Ideally, the roof vapor barrier would connect onto the wall air barrier before these structures are added, but I know that this isn’t always an option.

Ensure vapor barrier continuity at the perimeter of hatches, skylights, and mechanical curbs. Often the roof vapor barrier stops at the wood blocking around these structures, but it does not need to. It could wrap over the blocking and create a continuous surface to seal that skylight or hatch frame to.

Finally, seal the vapor barrier to all ducts, conduits, drains, and supports that go through the roof deck. Sealing the air/vapor barrier where it has been cut open to allow a penetrating object is often just a matter of some compatible tape or mastic – not difficult. Then, once the roof insulation goes on that sealant gets sandwiched so it is unlikely to separate. The only common penetrating object that cannot be sealed to directly with the typical air/vapor barrier membrane is a combustion flue.

Sandwiching, connecting to the walls’ air barrier, and sealing to objects that penetrate the roof will make your vapor barrier do more. It will live up to its true potential as a vapor *and* air barrier and it will be happy! Phew! We survived one more industry topic together.

## Mike Goes Solar: Long-Term Goal, Short-Term Political Influence... I Hate Politics

By: Mike LaCrosse

I hate politics in almost every form, but they are important to follow when they apply to aspects of your own life in order to make responsible decisions. As such, our recent commitment to “go solar” this past August was largely driven by political reasoning, based on where the solar industry is at, and where it may be headed.

Over the past couple of years, my wife and I have been taking baby-steps to try and live a more environmentally-conscious and less dependent lifestyle. Although it’s no baby-step, solar has been a part of this lifestyle plan, but we didn’t have any specific timeline for it, except for thinking it would be many years down the road. Politics of the industry expedited that part of the timeline.

**Continued on pg. 3**



*Our PV array is just under 3.5kW and is comprised of ten (10) 72-cell modules. It's sized to produce 120% of our annual needs.*

We don't require a lot of electricity. We installed a 3.45kW grid-tied system, but we could have gotten away with a 2.7kW array and still produced 100% of our annual demand. The system we currently have produces about 120%, so we are currently racking up solar credits. We opted to go with an oversized array for the extra capacity and with our future goal of being off-grid in mind. More presently, we oversized the system out of anticipation of our electric usage increasing as our kid, and someday kid(s), get older. If we didn't have a specific timeline for the array, why didn't we just wait till our long-term, stable electric demand was

known? Or why didn't we just add the additional capacity when needed? Like I said, politics. Oh, and the off-grid thing I mentioned, that's not a goal based only on personal reasons. Politics come into play there, too.

There is a feud that is growing between the solar installers and the utility. The topic is one Jon Haehnel and I have discussed heavily in the past, and is a topic that could be its own article. I'll try to stick to the essentials here. The solar installers are riding the crest of the solar wave, which is fueled largely by rebates/tax credits and low materials costs. They are pushing to put up as much solar as they can for monetary gain. Let's stop there for a second: The cost of solar has been on the decline for years, making solar more and more enticing. However, a conversation I had with my solar installer indicates that prices are actually starting to rise again. We did not go into depth on the topic, but the sense I'm having is that it has a lot to do with restrictions on Chinese products into the market, causing the costs of other products to rise. A simple supply-and-demand type scenario. It seems that, for now, solar prices really are at rock-bottom. That's political reason #1 for going solar. Regarding rebates, they are only going to keep dropping. In fact, New Hampshire just suspended all 2017 rebates until the new 2018 fiscal year budget for the allocation of rebates, could be sorted out. The reason is that the funds available are being claimed much faster than anticipated. The current rebate is \$0.50/watt with a \$2500 cap, but it looks as if that will drop to somewhere around \$0.30/watt with a \$1500 cap for all new applications. That's a huge drop, and unfortunately our application didn't make it in before the cut-off. However, we didn't want to be stuck in the same situation even just a year from now, in case the rebates dropped again. At the federal level the tax credit is still 30%, but only because of an extension created in 2015. Starting 2019, this credit is slated to drop until it reaches 10% in 2022. That's in only a little more than 4 years. Keeping true politics out of it as much as possible, I'm not optimistic that the current administration will pass another extension. Political reason #2.

Coming back to the feud I mentioned. On the flip side of the installer is the utility who is losing revenue due to the influx of solar, but still must be there to handle all of the produced energy put into their infrastructure. Sounds like a "lose-lose" for the utility, right? Maybe for now, but they won't be pushed around for long. In fact, my utility, Eversource, just passed a new metering tariff that says any new solar customers will only be credited for 25% of the distribution charge per excess kWh that is put into the grid by an array. That's a change from a credit equivalent of \$0.04 per kWh to \$0.01 per kWh. Sounds trivial, but when it's per each kWh, it adds up. Having done the math on my own personal bill it would be like saying that I would only get 0.8 kWh credits for every 1 kWh excess put back into the grid, or 80% credit. The utility will keep doing things like this – slowly and in small steps so as not to create a mutiny within the masses. It's the frog in boiling water analogy. Thankfully, we were grandfathered in on the 1-to-1 kWh credit tariff, but that was a move made consciously out of anticipation of this new tariff. Political reason #3 for going solar.

We didn't pan out perfectly on the state rebate end of things, but we got the full 30% federal tax credit, and made it in before the new metering tariff. Seems like overall, we got solar up in time, and should be set, right? Well... the utility still has hold of us in that we have a monthly

**Continued on pg. 4**

customer connection fee of about \$13.17. For as long as we're connected to and utilizing the utility's infrastructure we're at the mercy of the utility regarding this fee. In fact, this fee has already risen in my bill from about \$12.50 just a few months ago. This puts a fear in me that one day, we as solar customers could be paying nearly the same in connection fees as we did for our entire bill during our pre-solar days. This fee is a number I will keep close watch on alongside with the cost of storage batteries. When the annual cost of being on the grid exceeds that of the annual cost for a battery, we will make our switch to go off-grid. Political reason #1 for eventually going off-grid...and on and on it goes.

Depressed? I promise to keep part two light. I'll put the heavy political aspects of solar aside and discuss the 'what' and 'why' of the products and newer technologies that I've implemented into my system as well as some other techy details.

---

## Coming Next Month:

- The Ping Pong Effect: A Review of Joe Lstiburek
- Let's Talk About Windmills

Connect with us:  
[www.zerobydegrees.com](http://www.zerobydegrees.com)  
802.522.9713



Each month look for our Quick Code here to access our newsletter on your smartphone.

Do you know someone who might be interested in receiving our newsletter? Email our Office Manager, Jocelyn, to have their address put on our mailing list. [jocelyn.warczak@gmail.com](mailto:jocelyn.warczak@gmail.com)

