To Tape, or Not to Tape

After several roof failures in the '90s, SIP manufacturers began recommending the use of SIP tape, in addition to traditional caulk and/or spray foam. Here's why.

The use of structural insulated panel (SIP) tape is a relatively new occurrence for building with SIPs and, prior to the mid-1990s, the use of spray foam and caulking was believed to be sufficient in meeting the requirements for the majority of SIP manufacturers. Then, in 1995, a number of roof failures in Alaska demonstrated several issues stemming from the improper installation of SIPs, such as OSB rot caused by air leaks, along with poorly sealed seams. It was after these failures that many SIP manufacturers began to recommend the use of SIP tape in addition to traditional caulk and/or spray foam.

"These failures were caused by people installing SIPs who seemingly were not trained properly or who simply ignored the manufacturers' recommendations on how to seal their panel packages," says Al Cobb, Director of SIPschool. "And while traditional sealing methods can create an airtight boundary when the panel is put together, when it's not applied properly, SIP tape can step in and become the 'belt and suspenders' approach to good panel installation."

Although SIP tape can be used as extra security in ensuring "airtightness," SIP designers and installers still require an understanding of basic building science, as well as air leakage and vapor performance, in order to ensure a proper installation. The geography, as it relates to weather, also plays a role in determining when and where to use SIP tape. What works in a cool, arid climate won't necessarily work in a warm, marine climate, and there is rarely a one-size-fits-all solution when using SIP tape in high-performance construction.

"SIP tape qualifies as a vapor barrier, meaning that it has no permeability to it, and – as a vapor barrier – it should always go to the warm side of a structure," says Cobb. "And while it's easy to figure out the warm side of the structure when you build in Buffalo or Key West, when you build in other areas of the country where there is more of a mixed climate, the building science side of tape installation becomes a little more prickly."

Because the SIP tape acts as vapor barrier, in certain situations it can virtually eliminate the panel assembly's ability to dry, particularly at the joint where moisture is most likely going to accumulate. By removing the ability of the assembly to dry in one direction, it reduces the durability of the system should water get into it. Because of this, SIP tape needs to be applied only when there is no risk of trapping moisture inside the assembly. This is most critical when the SIP tape is going on the inside of the panel, particularly on a roof assembly. If the roof is not complete, the builder runs a serious risk of rainwater and moisture getting into the assembly and being trapped by the SIP tape. In short, SIP tape should never be installed until the roof is 100 percent watertight.

"I have seen numerous times where SIP tape was installed on the underside of a roof panel and then the roofer comes along and puts down a peel-and-stick membrane underlayment with zero permeability on the outside of the panel," says Cobb. "This creates a potentially catastrophic situation where you have a vapor barrier on both sides of the assembly. When moisture gets in, it's trapped with no place to go and the assembly will never dry simply because it can't."

If the code requires tape on the outside (because the outside is the

"warm side") the tape should be applied accordingly and the roof assembly is then allowed to dry to the inside. In this instance, the SIP tape needs to be applied immediately after the panel is installed and before the roof installer arrives to the jobsite.

"Obviously, if tape is to go on the outside, it must be installed before the roofer gets there," says Cobb. "In this case, the tape doubles as a means of protection from water and air getting into the assembly by virtue of the fact that it's on the outside."

The actual application of the SIP tape is a fairly straightforward task. Before putting up SIP tape, the installer needs to first ensure that the panel's surface is clean, dry, and free of any contaminants so that the adhesive can adhere. Then installers peel off several inches of release backing and press the tape firmly into place.

Like any good tape, SIP tape must be firmly embedded into the outer skin of the panel. This action requires the use of a proper tool, such as a laminate roller or a putty knife, in order to apply enough concentrated load directly to the specified area so that the tape's adhesive is effectively 'pushed' into the skin.

"OSB is probably the most imperfect surface you can apply the adhesive to and people will often apply the SIP tape just like they would Scotch tape, kneading it down with their fingers," says Jonathan Early, President and Founder at SIP-SEAL, a company specializing in sealants and seam tape for the SIP industry. "But with your fingers, you just can't get enough pressure to work the adhesive into the rough surface, which is why we suggest using something like a metal or plastic drywall blade. It's not a long or particularly laborious thing to do, and it's actually rather quick when it's done properly. This is a very important part of the installation."

In order to minimize wrinkles and air bubbles in the SIP tape, installers will need to push the SIP tape into the joint from the center, working outward with a smooth, clean motion towards the edges of the tape. At the end of a roll of tape, make sure to overlap at least three inches of the new roll over the previously installed portion of SIP tape to help ensure an airtight seal.

"If you just slap the tape onto the face of the panel without any attention to the condition of the skin or by not using a tool, there is a good possibility that your tape will lose its bond, especially if it's cool, and you are going to come in the next day and find the tape you put on the ceiling is now on the floor because it didn't stick properly," says Cobb. "It's not a failure of the tape; it's a failure of the installer if they didn't follow the instructions correctly."

Ultimately, the use of SIP tape helps to mitigate the risk of building in parts of the country where the weather is harsher and in situations where the installer has less experience in building with SIPs, which is why many manufacturers have adopted the product. And while it's true that SIP panels can perform admirably without this backstop and that SIP tape is not always necessary for each and every build, SIP tape – when installed correctly – can provide some peace of mind that issues concerning moisture accumulation will not occur.