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How Well Do Taped Seams on Rigid Foam Work Long Term?

With the advent of air barrier systems and alternatives to traditional housewrap water resistive barriers, there has been a lot of discussion about taping of materials and shrinking of foam. Most of this messaging is coming from the mechanically fastened building wrap industry, as they see other systems as competitive threats.

The reality is that adhered or spray systems are rapidly becoming the standard in commercial construction, and this involves taping and sealing of all substrate joints, window penetrations, brick tie fasteners, transitions to roofs or foundations, etc. The technology has advanced – without tape and flashings, even mechanically fastened wraps do not perform as a system. Rugged testing of the tapes and sealants for air barrier assemblies, such as E2357 or S742 tests, subject entire walls to high pressure loads and temperature cycling. UV, temperature, and pressure testing are used in tests to qualify tape and flashing systems as water resistive barriers. The testing proves the tapes and flashing work, and are durable.

Advanced tape technology, such as flexible butyl based flashing systems and solvent acrylic adhesive joint tapes, are designed to work even in very cold temperatures, and are proven to be durable over many years. These tapes borrow from the technology developed to seal air supply and furnace ducts – that need to perform for the lifetime of the building as well. Older tape adhesive technology that would harden or lose tact over time has been left behind. The new technology flashings and tapes have made their way to the residential construction market, and are part of nearly every window installation. Manufacturers of foam sheathing, such as Atlas, have erected exposed sheathing test walls that have endured snow, rain, hot summers, UV exposure, strong winds, etc.



Fig 1. Michigan Exposure Test Wall – Atlas EPS



Fig 2. Mississippi Exposure Test Wall – Courtesy Atlas Wall CI Board division

Despite the scrutiny and testing, rumors persist that foam sheathing with taped joints will somehow fail long term expectations. Until recently, most foam sheathing was extruded polystyrene or polyisocyanurate, and collectively referred to as “Styrofoam” (a Dow trademark) by the general populace. Why should users of ThermalStar One not have some concern?

First, ThermalStar One is built on EPS (EXPANDED polystyrene) technology. EPS is stable foam plastic, with zero gasses in the foam cells subject to aging (replacement with air). Other polystyrene rigid foam products have gasses that eventually get replaced by air, which changes their physical composition, and may have an effect on dimensional stability over long periods. EPS has only air in the insulating cells, so the thermal and dimensional performance remains constant.

The stability of EPS, compared to other rigid foam products, is what makes the product perfect for commercial EIFS walls. If EPS were subject to shrinking, these walls would look like checkerboards over time – but they do not! Note that the LOW quality commodity EPS sold in DIY stores or hobby shops is an exception, NOT the rule. Invariably, stories of shrinking EPS or water absorption are traced back to very low quality retail “beadboard” never used in engineered systems such as ThermalStar One.

Second, ThermalStar One is EPS permanently bonded to OSB. The EPS is not a standalone component; it is restricted from movement by the OSB. The OSB is protected from thermal cycling by the EPS, and from moisture cycling by the polymer film and tape system on the outer layer of the EPS, which leads to a very stable wall. This technique of permanently bonding OSB to EPS is proven in the SIPS industry, the stability is proven technology.

Finally, Atlas has tested the taping and sealing system to prove compliance to code requirements. This is testing that the prescribed code compliant water resistive barrier, #15 asphalt felt paper, is not required to demonstrate compliance. The combination of a permanent OSB, water resistant EPS, durable water impermeable polymer film, and acrylic adhesive taped joints is much more durable than traditional systems.

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