



Comparison study of current industry standard self adhered membrane (SAM) with 3M Air and Vapor Barrier Membrane 3015

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Self adhered membranes are prefabricated air, water and/or vapor barriers that are intended to be flexible and easy to install. Different products provide different levels of protection. A single SAM can be an air barrier, a water barrier, a vapor barrier, or any combination of two or all three of those things. They are typically self-sealing and designed to provide some resistance to puncture and tearing. Most self adhered membranes on the market today are designed to work with a family of products including primers and specialty flashings to provide a continuous, whole-building barrier. While advantageous in that they provide a factory set dimension of thickness uniformly across the surface, historically speaking they have been known to have some drawbacks. Speed of application, delaminating after install, troublesome detailing at penetrations, and temperature limitations have all been factors that have caused designers and contractors to turn to fluid applied weather barriers.

3M, headquartered in St. Paul, MN, has set out to make a new high performance SAM which addresses these weaknesses. By using existing technologies and applying them to construction materials 3M is able to offer historically documented performance coupled with industry innovation. Recently, BCRA was invited by 3M to witness a side by side comparison study and installation time trial that showed the innovation that 3M can bring to this market. In this study, two identical walls were constructed, 20' tall x 40' wide, each with four roughed in window penetrations. A local contractor was asked to install their favorite self adhered membrane product on one of the walls and 3M Self-Adhered Air and Vapor Barrier Membrane 3015 on the other. The contractor chose Grace Perm-A-Barrier, a SAM they had used multiple times before and were comfortable with. The experience was informative for everyone present at the test and eye opening for the contractor.

The Products

Grace Perm-A-Barrier® Wall Membrane is .9mm of rubberized asphalt integrally bonded to .1mm high density cross laminated polyethylene film. The system employs a water based primer, Bituthene Mastic, and rubberized asphalt/polyethylene flashing to provide a complete air, vapor and water barrier system. This material is a good representation of the common asphalt type SAM's on the market today.

3M 3015 is a 0.25mm thick membrane consisting of a proprietary film and acrylic pressure sensitive adhesive. The adhesive does not contain any asphalt or butyl and therefore requires no primers, specialty flashings, or additional adhesives.

Figure 1: Completed Installation

Substrate Preparation

Most SAM type products on the market today require a primer be applied to an approved substrate for the membrane to properly adhere to the wall. This one step requires hours of additional prep work, equipment (sprayer or rollers), and drying time before the installation of the membrane can begin. In the side by side comparison, the Grace Perm-A-Barrier® employed such a primer, which required 1-4 hours to adequately dry. This proved to be a major setback for the time trial. 3M 3015 does not require a primer; it is truly a "peel and stick" product.



Installation Method

The sheer weight of most products makes them difficult to handle and install. The contractor's product of choice weighs 67 lbs a roll and needed to be cut into 6' sections just to lift and position it properly onto the wall. Longer sections were attempted but the material folded over on itself and had to be scrapped. 3M

3015 is about 1/3 the weight of the Grace Perm-A-Barrier. This lighter weight product was easily lifted into place without cutting, allowing the contractor to install a continuous piece with no vertical seams for the entire length of the roll (75' if desired). In this installation, the wall was 40' wide which meant no vertical seams.



Figure 2: Industry standard SAM installation

Laps and Seams

While installing the Grace Perm-A-Barrier® product, manufacturer's recommendations require the contractor to apply a bead of Bituthene Mastic along all top edges, seams, and cuts to allow the product to adhere to itself. 3M 3015 requires no additional material for the product to adhere to itself, simply peel and stick just as on the wall. This also applies to patching tears and holes, just cut a 4"x4" piece (or larger if needed) of 3M 3015 and apply directly over the tear

Figure 3: 3M 3015 Installation

Material Coverage

Prior to installation it was noted, when looking at the pallets of the materials that would be used to cover the 20'x40' walls, that the Grace Perm-A-Barrier® is a heavier, harder to manage roll that when in shipped form takes up more space for effectively the same amount of coverage area as the 3M 3015. When you consider also the additional equipment needed for application of the primer this means a significant decrease in the amount of layout space required for the 3M 3015.



Installation Time

Including the additional time required for the primer, the Grace Perm-A-Barrier® took roughly twice as long as the 3M 3015 to install. To cover each of the 20' x 40' walls installation of the Grace Perm-A-Barrier® took 3 hours and 15min. while the 3M 3015 took 2 hours and 50min. But add in the additional time priming the surface, including set-up of equipment, masking, spraying, take down/clean up of equipment and then allowing the primer to effectively dry added around 2 hours and 30 min. of additional time. With compacted construction schedules and small windows of installation opportunity, these time factors can become critical. This is particularly impressive when you consider that the contractor had never used the 3M 3015 product before and was very familiar with the Grace Perm-A-Barrier®. Remember, they chose the Grace Perm-A-Barrier® as their go-to self adhered membrane. When comparing installation time at the penetration flashing on a single window, the Grace Perm-A-Barrier® and the 3M 3015 were comparable in labor time. Again, the main advantage is seen with the primer-less system.

Adhesion

At the end of the trial the overall adhesion was noted for both materials. The Grace Perm-A-Barrier® had started to delaminate in some areas, especially where it was adhered to itself. There was no delaminating noted on the 3M 3015 product.



Figure 4: Window Penetration Detail

Opacity

The contractor commented on the fact that the 3M 3015 product is translucent, allowing easy location of fasteners and studs behind the SAM. When using the Grace Perm-A-Barrier® they need to mark the studs in chalk on the membrane.

Additional Comparisons

Outside of the side by side installation, there are other notable comparisons to be made between the two products.

- **Installation Temperature**

3M 3015 can be installed at temperatures as low as 0°F (-18°C), the Grace Perm-A-Barrier® can only be installed when the temperature is at or above 40°F.

- **Exposure to sunlight**

Most Self Adhered Membranes on the market cannot be exposed to UV light for extended periods, usually less than 30 days, or they start to degrade. Grace Perm-A-Barrier® is rated for 60 days or less and the 3M 3015 is rated for 180 days or less offering much more flexibility in scheduling and dry-in procedures.

- **Flammability**

Current industry codes, including NFPA 285, are limiting the flammability of materials used in envelope systems and are calling into question the use of asphaltic type membranes. 3M 3015 has been tested in accordance with ASTM E84 (Flame Spread = 15, Smoke Developed = 45) to show a benefit over asphaltic type membranes. Additionally, vapors from mastic and primers are harmful and highly flammable. No mastic or primers are needed for the 3M 3015 installation.

- **VOC's**

The Grace Perm-A-Barrier® Primer is listed as having a VOC content of < 10g/L, which is in line with most primers. While this is compliant with EPA requirements, the 3M 3015 did not require any primer.

- **Material Testing**

Both SAM systems meet:

ASTM D 1970 (Fastener sealing)

ASTM E 96 (Vapor Permeance)

ASTM E 2178 (Air Leakage Rate)

ASTM E 2357 (Air Leakage Assembly)

High Performance

In the current design/construction market the exterior enclosure of the building is getting much of the attention with a focus on durability and energy efficiency. Many of the SAM's on the market today have been around for decades with little in the way of enhancements or performance modifications. 3M has once again risen to the challenge and brought innovation to the construction site. The 3015 SAM rises above the current industry standard offering a true high performance material to designers and contractors.

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