DUPONT BUILDING SCIENCE
BULLETIN

# Self-Adhered Flashing Tapes: Which Should You Choose?

Flashing tapes are designed to create a reliable joint that helps seal the interface between wall penetrations and wall system components such as windows and doors. They also help divert incidental water back out towards the exterior. Because they are a crucial component in helping prevent water from damaging walls, it is important to select flashings that will perform under the various conditions that a wall system may be exposed to.

Today, the most popular are self-adhered "peel-and-stick" tapes that create a tighter, more continuous seal than metal or non-adhesive flashings. These consist of a top sheet, an adhesive sealant typically made from rubber modified asphalt (bitumen) or butyl rubber compounds, and a release liner.

The release liner is peeled off to expose the adhesive that holds the flashing in place and seals the joint. The top sheets strengthen the flashing to guard against handling damage during installation, serve as a water-resistant layer, and help prevent UV rays in sunlight from degrading the adhesive. Most top sheets are plastic films or foils, although some are stretchable laminates such as DuPont™ FlexWrap™.

## What Determines Flashing Performance?

There are many factors that impact the performance of self-adhered flashing products. In addition to forming a reliable, durable seal to the substrate, other performance attributes include ease of installation, range of installation conditions, as well as the physical property attributes of the Flashing. However, in this report, the Properties that will be addressed are weather resistance, thermal resistance, and adhesion durability.

Samples of several commercially available products were tested for weather resistance and adhesion durability. (see Table 1) Similar products were subjected to thermal testing. Samples labeled "A" have modified asphalt adhesive and those labeled "B" have DuPont butyl adhesive.

Sample B1 is **DuPont™ FlexWrap™**, a laminate made with DuPont™ Tyvek® brand protective material and a premium butyl adhesive sealant, along with polyethylene film and elastic fibers. Sample B2 is **DuPont™ StraightFlash™**, a laminate also made of Tyvek® brand protective material, polyethylene film and butyl adhesive sealant. StraightFlash™ is designed to help protect the heads and jambs of rectangular windows, while DuPont™ FlexWrap™ stretches and conforms to provide seamless protection for window sills and round-top and custom-shaped windows.

**TABLE 1. COMPOSITION OF FLASHING SAMPLES**

| Sample Label | Top Sheet | Adhesive |
|---|---|---|
| A1 | Polyethylene | Modified asphalt |
| A2 | Polyethylene | Modified asphalt |
| A3 | Foil | Modified asphalt |
| A4 | Polyethylene | Modified asphalt |
| B1 | Multi-component nonwoven-based laminate | DuPont Butyl |
| B2 | Multi-component nonwoven-based laminate | DuPont Butyl |
| C1 | Control – vinyl only | Control – vinyl only |

## Environmental Exposure & Durability

Resistance to weathering damage is very important because flashings may be exposed for extended periods during building construction. To evaluate the long-term performance of exposed and in-service materials, flashing samples were subjected to accelerated weather conditions. Samples were adhered to rigid vinyl strips and cycled in an Atlas Weatherometer per ASTM G26/SAE J1960 for 14 weeks. The Weatherometer simulates outdoor conditions, including elevated temperature and humidity, intermittent water spray and strong UV light.1

Figures 1, 2, 3 and 4 are photographs of the samples after exposure in the Weatherometer for one week. Asphalt samples A1, A2 and A4 were significantly degraded. The top sheet and much of the adhesive for Sample A1 were destroyed. Samples A2 and A4 had significant curling of the top sheets. Sample A3, also showed some delamination. Samples B1 and B2 (DuPont butyl ) showed no significant degradation.

Figures 5 and 6 (shown at right) show the samples after exposure for 14 weeks in the Weatherometer. Samples A1, A2 and A4 were almost totally destroyed. For Sample A3, the adhesive appeared to attack and leach through the foil top sheet. The DuPont flashing products performed much better under these extreme conditions and maintained the integrity of the product.

## Adhesion Durability

Adhesion durability is critical because under all conditions flashing must adequately adhere to substrates to help prevent water intrusion. The flashings listed in Table 1 were subjected to adhesion durability tests based on the AAMA 800 voluntary test methods for caulks. These tests measure the adhesion performance of the self-adhered flashings after heat aging and after water immersion.

**Figure 1. Samples after 1 week of exposure in weatherometer.**

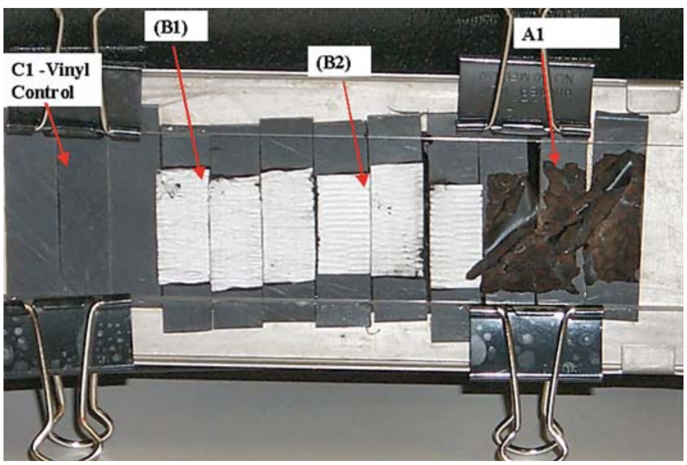



**Figure 2. Samples after 1 week of exposure in Weatherometer.**

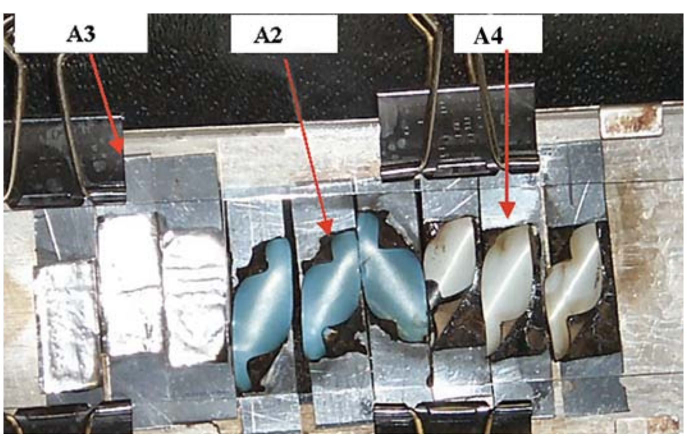



**Figure 3. Close-up of samples after 1 week in Weatherometer.**

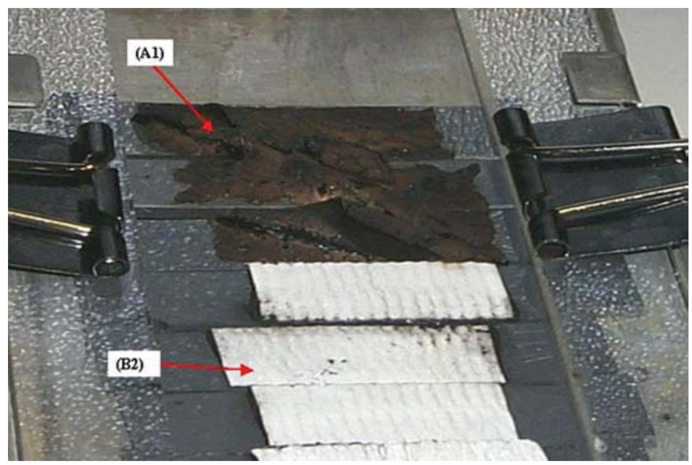



**Figure 4 (Detail View of Figure 1). Close-up of samples after 1 week in Weatherometer.**

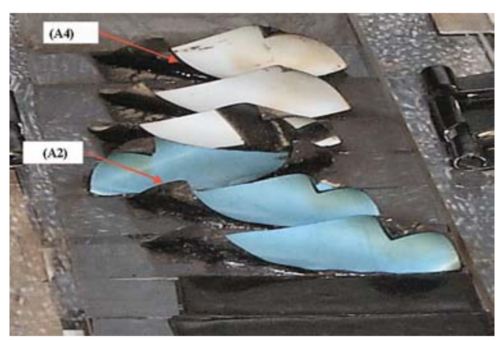


Figure 5. Modified asphalt samples after 14 weeks in Weatherometer.

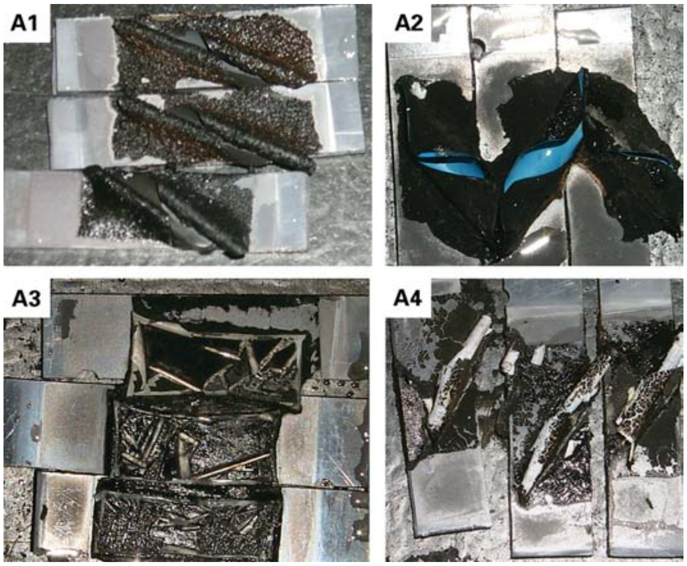
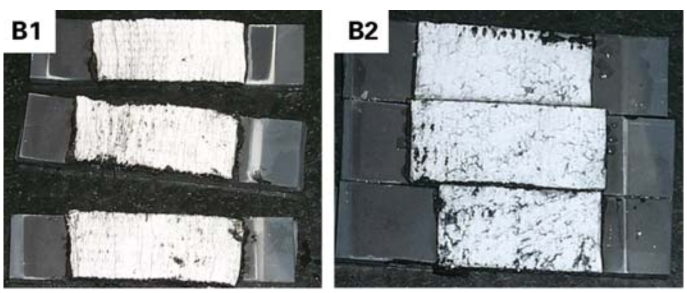



Figure 6. Butyl samples after 14 weeks in Weatherometer.



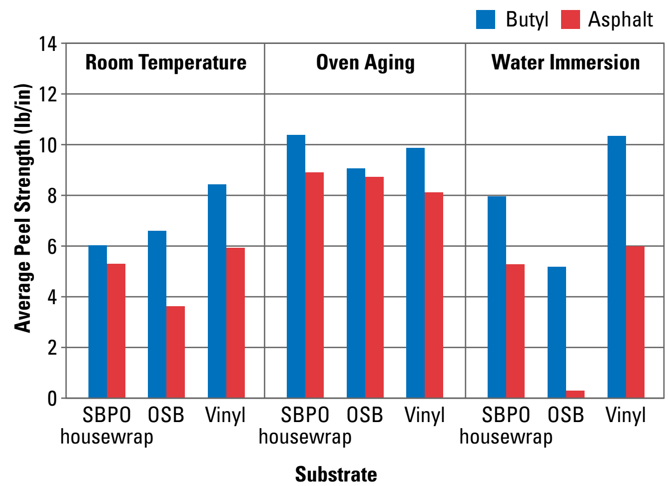

These are applicable tests, since like caulk, flashing must continue to adhere adequately to a substrate after being subjected to water and heat.

The substrates chosen for the tests were Oriented Strand Board (OSB), rigid vinyl nailing flange strips and SBPO (spun bonded polyolefin) housewrap. Flashing is commonly installed on all of these materials.

Flashing samples were applied to dry substrates at room temperature. Then they were aged at room or elevated temperatures of 160°F for 2 weeks. A third set was held at room temperature for one week and then immersed in distilled water at room temperature for one week.

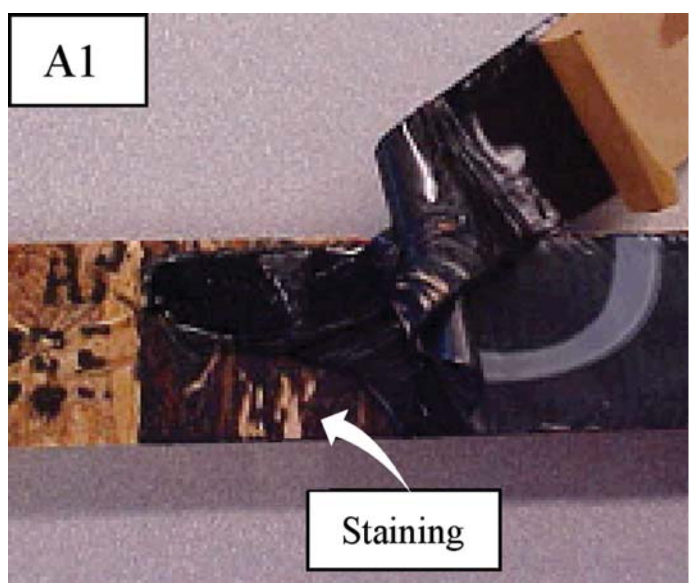
Adhesive strength was measured using 180° peel tests. Figure 7 shows the test result where the average of the DuPont butyl peel values are compared to the average of the asphalt values. In general, all samples adhered to the substrates when applied at room temperature condition and their adhesion strengths increased with oven aging. The most striking difference occured during the water immersion tests with OSB as the substrate. **Here the asphalt samples lost virtually all of their adhesion while the DuPont butyl adhesive maintains over 85% of its room temperature adhesive strength.**

Figure 7. Peel adhesion comparison of butyl vs. asphalt flashing after aging per modified AAMA 800




Another observation is that the oven aged asphalt samples left oily stains on the OSB substrates after they were peeled away (see Figure 8). This staining suggests that some of the asphalt adhesive components have migrated from the compound to the OSB. The DuPont butyl samples showed no negative interactions with the substrates.

Figure 8. Oven aging of A1 caused staining of OSB.



## Thermal Resistance

Thermal resistance is extremely important because the flashings must withstand severe temperature swings, depending on the climate, after the building siding is installed and maintain their performance for many years. Once the window is installed and the siding is on the building, flashing remains an essential component in helping prevent moisture intrusion at wall penetrations. Even though flashing is protected from UV light by the siding, degradation and failure can be caused by thermal cycling. Figure 9 shows a wall surface temperature of 170˚F on a sunny 85˚F day in California. Can you be confident that the flashing behind this wall is still performing well?

**Figure 9. Wall surface temperature on an 85°F day in California**


Five commercial self-adhered flashing products were tested for heat aging durability on both OSB and vinyl strips. Figure 10 shows these products before aging: the two products on the left are DuPont™ FlexWrap™ and DuPont™ StraightFlash™ butyl adhesive based flashings, the three on the right are asphalt adhesive based flashings.

**Figure 10: Flashing samples on OSB before aging. Two on left are DuPont butyl based, three on right are asphalt based.**

Figure 11 shows these same products after aging for 24 hours at 160˚F. Note how the top sheets of the asphalt based products are beginning to curl, leaving an adhesive stain on the OSB. Figure 12 shows the samples after 7 days at 160˚F. All three of the asphalt flashing top sheets have severely curled back, exposing adhesive stains on the OSB. The DuPont butyl samples have maintained their integrity. It is important that the top sheet as well as the adhesive have good temperature and UV resistance, since the top sheet provides integrity for the flashing and helps maintain a continuous seal between the window and wall.

**Figure 11: Self-adhered flashing samples after aging 24 hours at 160°F. Note top sheet delamination for asphalt**

**Figure 12: Self-adhered flashing samples after aging 7 days at 160°F.**

Figure 13 shows these same self-adhered flashing samples on vinyl strips, which is a common substrate for flanged windows. Once again, the asphalt adhesive samples have degraded signficantly after heat aging. The top sheets have delaminated and curled, leaving the adhesive exposed to the elements. Without a top sheet to provide integrity to the flashing, the adhesive is free to flow and breaks could form at the interface between the window flange and the wall due to thermal expansion and contraction. In addition, the closeup shot of Figure 14 shows that the vinyl strips have deformed, possibly due to an interaction between the adhesive and the vinyl. Deformation of the window flange could cause the adhesive to tear or pull away from the wall and create a pathway for leakage.

**Figure 13: Self-adhered flashing samples on vinyl strips, before and after heat aging 7 days at 160°F**

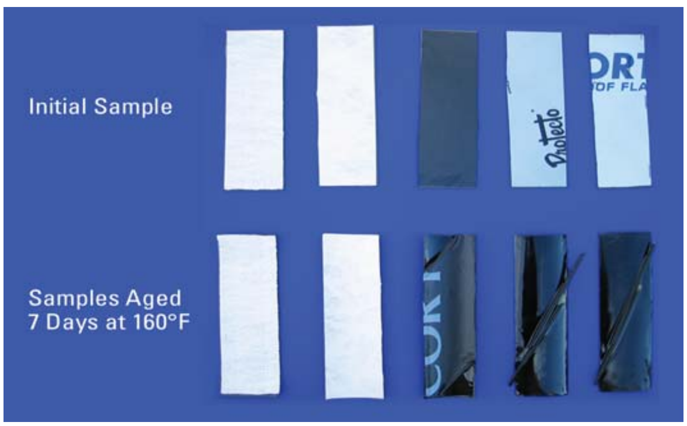



**Figure 14: Closeup shot of samples aged 7 days at 160° F on vinyl strips. The sample on the left is DuPont™ FlexWrap™ and the ones on the right are asphalt based.**

## Conclusion


These tests simulate conditions typically encountered during and after construction that can cause flashings to fail. They highlight performance and durability differences in the top sheets and adhesives used in commercially available flashings.

Accelerated weathering with UV light, heat and moisture degraded flashings with asphalt adhesives significantly more than those with DuPont adhesives. The asphalt based flashing showed significant curling and delamination from the sheathing surface. Top sheet degradation and adhesive embrittlement were also observed.

Tests of thermal and moisture resistance also revealed differences in adhesive and top sheet durability. Although the building's exterior siding can protect flashing from UV light degradation after installation, it is still vulnerable to long-term thermal exposure within the wall. It is essential that the top sheet be made of a highly durable material so that it can provide integrity to the flashing and help maintain a continuous seal between the window and wall.

Once again, the DuPont flashings outperformed commonly used asphalt based products even after exposure to thermal aging and showed superior dimensional stability and resistance to adhesive flow. Key differences were also seen in moisture resistance. Asphalt based flashing tapes exhibited almost total loss of adhesion to OSB when immersed in water for one week while the DuPont flashings maintained over 85% of their peel strength.

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