

FLASHING



Flexible Flashing Tips for getting the most out of these useful products

BY CHARLES WARDELL

When *JLC* published its primer on flexible flashings a decade ago (“Choosing Flexible Flashings,” Jun/01), these non-metallic, self-adhered membranes were just becoming common on jobsites. Today, they’re everywhere. They have all but replaced felt splines for the edges of finned windows and are now the standard for sealing most other roof and wall penetrations. Ease of use is a big reason: All of these products work well on flat, two-dimensional surfaces, and accordion-style membranes such as DuPont’s FlexWrap or Typar’s Flashing Flex will conform to three intersecting surfaces, such as the corner of a window opening.

Manufacturers have made it a priority to teach contractors how to use these products correctly, and their websites offer photos, videos, and animations on proper installation techniques. This magazine has published several articles on the subject, and the annual *JLC* Live show always includes demonstrations of how to flash windows and doors properly. But despite all this effort, experts still see lots of mistakes and misunderstandings in the field—about the materials and key installation details. This article addresses some of those common misconceptions.

The 2001 article went into detail on the chemistry behind flexible flashing products as well as the choices available. The



manufacturers we interviewed confirmed that those basic formulations haven't changed much since that article. So we will quickly review the three main product types and then look at a few installation issues that warrant close attention.

THREE PRODUCT TYPES

Flexible flashing for residential work is available in thicknesses from 12 to 70 mils, in widths from 3 to 36 inches, and with several types of facings. Despite this variety, the products can be broadly categorized into three main types: rubberized asphalt, butyl, and acrylic. Manufacturers offer some different formulations and enhancements (for instance, one tape combines butyl and acrylic), but the general performance expectations are the same within each category.

Rubberized asphalt (RA). This is the most common and least expensive type of peel-and-stick eaves flashing (1). One face is laminated to a high-density polyethylene backing while the other is covered with release tape. The asphalt is chemically modified to make it more elastic, allowing it to expand and contract with the substrate. RA is a great all-around flashing material and it sticks to a variety of substrates. It's also self-healing, which means it's supposed to seal around fasteners driven through it.

One drawback to RA is its narrow range of application tempera-

tures when compared with other flashing types. Depending on the product, it can stiffen in cold temperatures, making it less likely to adhere properly. Some manufacturers advise warming the product before using it when temperatures fall below 55°F, but installers tell us that problems occur mostly below 45°F. Flashing can be warmed with a heat gun or by putting it in an ice chest with an incandescent bulb (be careful not to overheat the tape or set it on fire).

At very high temperatures, such as you might find on walls exposed to constant summer sun (180°F temperatures are not unusual for walls in the South and Southwest), RA flashings can soften and lose adhesion. James Katsaros, R&D team leader at DuPont, told me that solvents from the asphalt have been known to leach out and stain the siding.

Long exposure to UV light has also been known to cause adhesion problems for RA flashing. Because of this, asphalt-based flashings should not be left uncovered for more than 30 days after application. But that said, Bill Rose, senior research architect at the University of Illinois and author of *Water in Buildings: An Architect's Guide to Moisture and Mold*, put two layers of RA flashing on a small flat roof 20 years ago and so far it hasn't leaked. That's not to recommend uncovered RA flashing, but rather to show the durability of high-quality products.

Butyl rubber. Compared with RA, butyl flashings are considered

Photos: 1, courtesy W.R. Grace; 2, courtesy DuPont



1. Rubberized asphalt is self-healing and sticks to a variety of substrates, but may not be stable at temperature extremes.
2. Butyl flashing has a wider temperature range than RA and sticks to more materials. Accordion-style butyl flashings can stretch at the corners of openings.
3. Solid acrylic flashings are designed to bond to substrates at the molecular level. They make the firmest bonds at the widest range of temperatures, according to some experts.
4. Some flashing manufacturers require an adhesive primer on certain substrates, the most common being gypsum sheathing, masonry, and the rough side of OSB. Primers come in spray-on and brush-on varieties.

to be of higher quality, and their prices reflect that (2). Butyl is a synthetic rubber used in many applications, including spacers for insulated glass. Butyl flashings are made by laminating the butyl rubber compound to a polyolefin-based film. Unlike RA flashing, butyl products contain no solvents or VOCs (volatile organic compounds), and they do not off-gas. They are supposed to be self-healing like RA, they stick better to a wider variety of materials, and they have better long-term stability. Butyl tapes can also be installed at lower temperatures than RA. DuPont's Flashing Tape, for instance, can be laid over a bare substrate at temperatures as low as 25°F; any colder and you'll need to use an adhesive primer.

Acrylic. These products, which consist of an acrylic adhesive and various backings, are thinner than rubberized asphalt or butyl membranes (3). Acrylic also makes for a better adhesive bond with many (but not all) materials, so it is sometimes used as the adhesive layer for butyl or RA.

The best acrylic tapes use a VOC-free solid adhesive that makes a molecular bond to the substrate. According to BuildingGreen.com, "Solid acrylic adhesives can form the strongest adhesive bonds at a wide range of temperatures and even achieve adhesion to damp or wet substrates." ProClima's Tescon and Huber's Zip System tape are examples: ProClima claims that its product can be applied in temperatures down to 15°F, while a Huber contact said that the company's tape has

an application temperature range of 20°F to 100°F.

Some acrylic tapes are pressure-activated. ProClima's Tescon Vana tape, for instance, feels as sticky to the touch as butyl or RA, but if you don't pressurize it, it won't bond. In an improvised test, I needed to apply firm pressure (I used a roller) to the tape in order for it to strongly grip the substrate.

Acrylic flashings are warranted for longer UV exposure than are RA products. ProClima has a 90-day warranty, while Huber offers a warranty for nine months of exposure.

ENSURING COMPATIBILITY

The big issue with flexible flashings has always been compatibility. Manufacturers have tweaked their formulas to address this, leading some contractors to believe that you can use any flashing anywhere. Not so. "Compatibility is still the No.1 issue," says Train2Build.com's Bill Robinson, who teaches builders about how to prevent moisture problems. There are two parts to flashing compatibility: how well it adheres to the substrate (the sheathing, the housewrap, or window fins), and whether it has an undesirable chemical reaction with that substrate.

Contractors report sometimes having problems with some butyl flashing sticking to asphalt products; manufacturers, however, say that this is not an issue, and certainly not with felt paper.



5. Compatibility is a big issue with flexible flashing, so make sure that the flashing is compatible with all substrates it will contact. The safest route is to use a flashing and housewrap made by the same manufacturer.

6. Certain caulks and sealants may be incompatible with particular flexible flashings. Silicone products, as shown here, should not be used with any type of flexible flashing.

7. This photo was taken on a jobsite in Denver, four to six weeks after installers had done their work, and the flashing is already failing. Incompatible with the vinyl window fin and the sealant, the rubberized asphalt flashing is pulling away from the window.

Putting acrylic tape on an asphalt substrate is theoretically OK if the surface isn't too oily, but that's not always possible to determine in the field. Even felt paper can be a problem. I put rubberized asphalt, butyl, and acrylic tape on 15-pound felt and rolled them to make a bond. After waiting a half-hour, we tried to pull the tapes off and found that the acrylic tape came off relatively easily, while the other two put up a real fight. We could remove only about half of each piece of asphalt and butyl tape.

Some substrates are problematic for all flashings. These include masonry and gypsum sheathing. "Their surfaces are loosely bonded, so the flashing products have nothing to stick to," says DuPont's Katsaros. Most flashings also have a tough time grabbing onto the rough side of OSB. The solution in all cases is to use an adhesive primer (4). Primers come in brush-on and spray-on forms, and they do maximize adhesion. While they're more common on commercial jobs than on residential ones, there should be a can of primer on every jobsite.

Windows. RA flashings shouldn't be installed over flexible vinyl because the plasticizers in the vinyl can cause the asphalt to flow and make the flashing lose adhesion. In some cases, a reaction with the flashing can make the vinyl brittle. This doesn't seem to be an issue with rigid PVC window flanges, but window manufacturers detail compatibility issues in their installation instructions or on

their websites, so it's a good idea to make sure you're using the proper flashing for the windows you're installing.

Two examples are Ply Gem, which uses rigid vinyl fins, and Marvin, which uses flexible vinyl fins on its fiberglass windows. Mark Waddell, an installation and applications specialist with Ply Gem, has no problem with high-quality RA flashing. Marvin, on the other hand advises against using any asphalt-based adhesives with its products. "We say that any tape used with our windows must not contain asphalt," says Eric Klein, an installation trainer with Marvin Windows and Doors. The company recommends butyl, which is compatible with nearly all substrates.

WRB issues. The other part of compatibility is how the flashing tape will interact with the rest of the weatherization system. "In my opinion you can't address compatibility without considering the weather resistant barrier [WRB], as well as any caulks and sealants that will be used," Robinson says.

Although some installers buy a mismatch of products based on what local suppliers carry, most WRB manufacturers will honor their warranty only if their product is installed with the recommended flashing, usually one made by the same manufacturer (5). The WRB and tape are formulated for maximum adhesion and to eliminate compatibility problems. "The easiest way to sort it out is to go with a company that provides a line of products that are its



8



9



10

own,” Robinson says. “DuPont, Fortifiber, and Protecto Wrap are three examples, but there are several others.”

Of course, some products aren’t sold as part of a system. “I’ve seen manufacturers come out with a new WRB but not recommend a compatible tape,” Robinson says. In these cases it’s up to the builder to decide if it’s worth the potential liability.

Sealant compatibility. Where sealants must be used, such as around windows and doors, flashing manufacturers may also specify which sealants are acceptable. For instance, some asphalt-based flashings can react with the solvents in some caulks and sealants in a way that compromises the seal, so it’s important to follow the recommendations of the flashing tape manufacturer.

The high surface tension of silicone caulk makes it a bad choice to use with even the best flashing tape (6). “The silicone surface is just too slick,” says Floris Keverling Buisman of 475 High Performance Building Supply, which is the U.S. importer and distributor of German-based ProClima flashings. Klein, from Marvin Windows, has come to a similar conclusion based on his own field-testing. “I did a test using a silicone sealant with an asphalt-based flashing and a flexible vinyl window flange,” he says. “It failed in a very short time.”

The bottom line? “Builders need to do their homework before deciding which products to use,” says Ply Gem’s Waddell. “If you

want to stay out of trouble, you need to look at the type of window, the housewrap, and the sealant as a system (7).”

MOISTURE ISSUES

Most tapes are impermeable, so they can form a wrong-side vapor barrier on the outside of the structure, causing vapor to condense behind them and eventually damage the material underneath. And if there’s a leak, an impermeable tape could, under certain circumstances, force the building to dry inward, something that can be difficult to do in winter.

It’s not common but it can happen, especially in cold climates. Some installers will put wide flashings beneath the siding where there’s a concern about splash-back, such as at inside corners. But doing so increases the chance of problems if there is excess moisture migrating out from inside the house. One option is to use a vapor-permeable tape such as ProClima’s Tescon, which has a perm value of 8—roughly the equivalent of latex paint. Siga’s WiGluV acrylic tape is vapor-permeable but is impermeable to water. When used around windows and doors, it keeps the weather out but allows moisture from inside the house to readily escape (8).

INSTALLING IT RIGHT

When it comes to installation, every little detail counts. Bill Leys

Photos: 8, Roe Osborn; 9, Mark Laliberte; 10, courtesy DuPont



8. Vapor-permeable tapes keep the weather out, but allow vapor from the interior to pass through. Here the white vapor-permeable tape goes between the window and the opening, which is wrapped in black acrylic tape.

9. This is a good example of a common installation mistake called reverse shingling. The flashing incorrectly laps over the Tyvek (rather than vice versa), and jamb flashing incorrectly laps over the head flashings.

10. Flexible flashing stretches to seal around circular windows in a single pass. The housewrap then extends over the flashing.

11. Even the best tapes won't work well when they have been in contact with a surface that is dirty or full of sawdust.

of Central Coast Waterproofing, in San Luis Obispo, Calif., discovered this after a homeowner who had just bought an 11-year-old home for \$1.4 million called him about a leak. The inspector hadn't found any major issues, but when Leys' crew looked further they found \$110,000 worth of water damage. Water had run down through the structure from the roof to the foundation, causing extensive rot. The culprit: a stucco-clad parapet wall on the roof deck that had been waterproofed with rubberized asphalt flashing. The contractor had stapled stucco paper through the flashing and, over time, water had seeped through the staple holes, even though the flashing was supposed to be self-healing.

"A lot of guys don't really understand how the smallest details can cause the biggest problems," Leys says. "They do 90% of the job right but screw up on the small details that will cause problems a few years down the road."

Bill Rose points out that these small details were much less problematic in older structures with drafty assemblies that dried out more quickly, but that today's building assemblies are less tolerant of error. "People may have gotten away with poor geometry in the past when the building was overheated and poorly insulated," he says, "but that's not the case anymore."

The most common mistakes—the places where installers need to pay special attention—are improper sequencing of flashings, im-

proper cuts, poor surface prep, and not properly seating the flashing on the substrate. Such problems are most likely where builders assign flashing work to the least-experienced crew members or to subs. For instance, plumbers, electricians, and HVAC contractors are sometimes responsible for flashing the holes they make in the building envelope, but few do it correctly.

Improper sequencing. Everyone we spoke with named improper sequencing, or reversing the layers of flashing, as the most common mistake seen in the field (**9**). That came as a bit of a shock: You would be hard-pressed to see anyone installing lap siding upside down because they understand that, absent very high winds, water flows downhill. But it seems that understanding sometimes evaporates when it comes to flashing. "I see a lot of gravity-defying flashing details where the upper layers go under the lower layers," says Paul Eldrenkamp, a Newton, Mass., design/builder and frequent lecturer on moisture-related issues.

One common problem area is the curved-top window. It's not unusual to see an installer piece in flashing on one side and work to the other, instead of working from both sides and meeting at the top. Half-circle windows are a great place to use flexible accordion-style flashing, which will follow the curve of the window from one side to the other without interruption (**10**). The trick then is to get the WRB properly installed over the flashing.



12. Small staple penetrations in a supposedly self-sealing flashing used on a rooftop parapet wall started to let water through. Just 11 years after the home had been built, the wall below that flashing had completely rotted out.

13. Although some installers use hand pressure to seat the flashing to the substrate, most flashings need to be rolled using a J-roller for proper adhesion.

14. For places that are hard to get to with a roller (such as inside corners), use the butt of a cedar shingle to press the flashing tape firmly against the substrate on both sides of the corner.

Most likely, installers rely on the adhesive to provide waterproofing. Bad idea. Flashing details should provide 100% mechanical drainage paths so that they shed water even if the adhesive fails. High-tech materials are no substitute for good installation details.

To be fair, improper sequencing isn't always obvious with flexible flashings. For instance someone might follow the correct sequence and flash the sides of a window before flashing the head, but allow the side flashing to extend up past the head flashing.

A good antidote to improper sequencing is a simple shift in mindset. Carl Hagstrom, a Montrose, Pa., contractor who does a lot of writing and training on proper flashing techniques, points out that people are far more careful when they're flashing roof penetrations. "I tell people to stop thinking of a window or door in a wall and instead think of it as a skylight. When I say that, the light bulbs go off. They pay a lot more attention."

Improper surface preparation. Regardless of tape choice, installers must pay attention to surface conditions. "It should go without saying that the substrate needs to be clean and dry, but it seems that not everyone gets this," writes Joe Lstiburek of Building Science Corp. "With tapes, the biggest single problem is folks thinking they can stick them to muddy, dirty, cold, wet, and frozen surfaces (11). You would think this is obvious. Amazing as it seems, folks keep trying to do it."

As mentioned, there can be adhesion problems with the rough side of OSB—even if it's bone-dry and clean—as well as with gypsum and masonry-based substrates. The best solution is to apply a primer, which will fill in any irregularities in the substrate and will provide extra adhesion. Flashing manufacturers have primers designed to work with their flashings.

Poorly placed fasteners. Just as it's foolish to rely on adhesion for waterproofing, the self-sealing properties of peel-and-stick flashings shouldn't be considered primary protection, as Leys' client found out the hard way. Fasteners should not be driven through the flashing in areas where water could collect, as in a windowsill (12).

Not rolling. Some installers give too much credit to flashing's adhesive abilities and simply lay it on the surface and press it on by hand instead of going over it with a roller (13). But the truth is that all flashing needs to be rolled in order to properly adhere. "This is a big problem," Robinson says. "You can't just use your hand to smooth it on. I use a J-roller to mash it onto the substrate." He suggests using a rubberized roller, as the metal ones can puncture or rip the membrane. And if you need to ensure adhesion in an inside corner, the square butt edge of a shingle can take the place of a roller (14).

Charles Wardell is a freelance writer and a contributing editor for JLC based in Tisbury, Mass.

Photos: 12, Bill Leys; 13 & 14, Roe Osborn