

Housewrap Errors

By Steve Easley

There Are Seven Common Mistakes Contractors Make When Installing Housewraps

GREEN BUILDING AND remodeling programs, the U.S. Environmental Protection Agency's IAQ Plus program and Energy Star now are paying well-deserved attention to managing moisture in construction. These programs are recognizing that a home's durability and indoor air quality can be affected by easily correctable mistakes when installing housewraps.

Millions of homes each year are re-sided, reroofed and have windows replaced. This is an excellent time for contractors to take a serious look at the building enclosure and make sure it's watertight. Thoughtful attention to proper construction details, installation and integration of flashings, building wraps and papers are critical to the longevity of homes. The following are the most common mistakes contractors make when working with housewrap.

During a wind-driven rain, a wall does not know it is not a roof. Therefore, it is important to ensure crews understand how to flash penetrations and install housewraps and kick-out diverter flashings at roof-wall intersections so water runs away from a structure. Water trapped beneath claddings can lead to deterioration and defects.

1: Roof-wall Intersections

A 1-inch rainfall will deposit 1,250 gallons of water on a 2,000-square-foot roof.

Because water flow is heavily influenced by gravity, roof-wall intersections are very leak prone. In addition, lots of materials are coming together at one location, and different trades are involved in putting the pieces together. Diligent remodeling contractors need to ensure these areas are flashed properly before roofing and siding is finished. To protect against leaks, contractors must understand proper moisture management means employing a system to reject water; it does not mean installing products haphazardly.

Water damage easily can occur at roof-wall intersections when flashing is neglected.



IMAGE 1

There is obvious moisture buildup at this roof-wall intersection. The contractor should have installed kick-out diverter flashing.



IMAGE 2

Water damage easily can occur at roof-wall intersections when flashing is neglected.

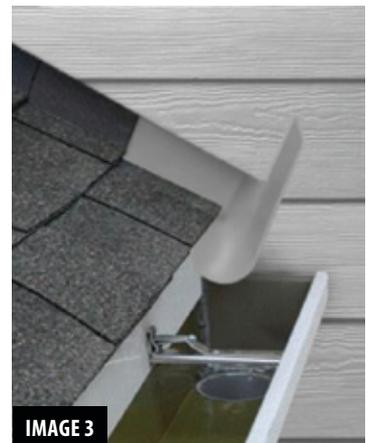


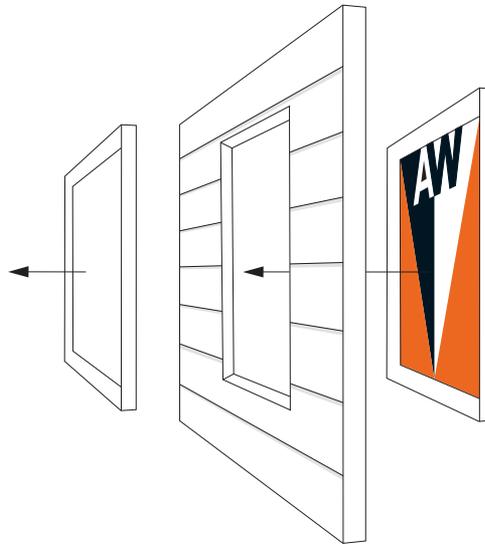
IMAGE 3

Premolded, seamless, kick-out diverter flashing is available in multiple colors. This product is manufactured by DryFlekt.



IMAGE 4

Metal kick-out diverter flashings often are poorly field-fabricated, which can lead to leaks.



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IMAGE 5

The metal flashing is reverse-shingled over the brick, which can lead to leaks.

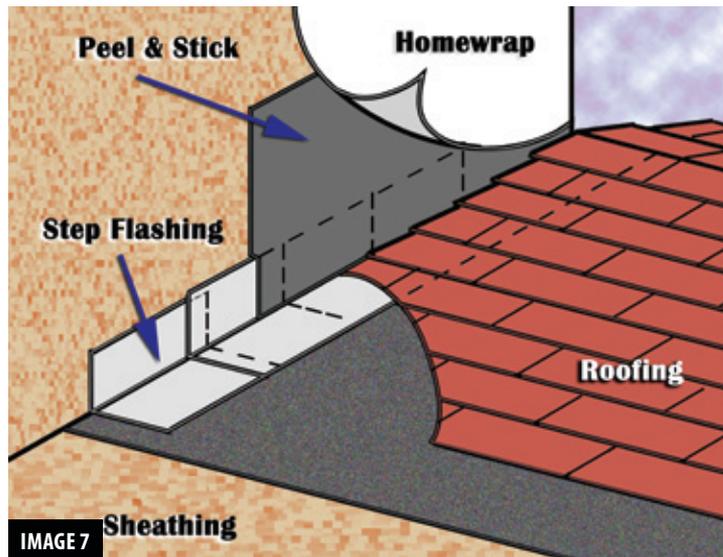


IMAGE 7

The peel-and-stick flashing adds another layer of protection by sealing over the step flashing onto the sheathing. If any water gets behind the housewrap, it will run onto the peel-and-stick flashing to daylight.



IMAGE 6

The housewrap was improperly installed behind the step flashing, allowing water that gets behind the siding to run down the housewrap and penetrate between the step flashing and housewrap. This will lead to a ceiling leak.



IMAGE 8

This is a properly integrated, seamless, kick-out diverter flashing with peel-and-stick flashing and housewrap.

To protect against leaks, contractors must understand proper moisture management means employing a system to reject water; it does not mean installing products haphazardly.

Notice the moisture concentration at the roof-wall intersection and over the window in Image 1. This intersection needs kick-out diverter flashings, which redirect water away from these troublesome details.

Image 2 shows what happens when kick-out diverter flashings are not used at roof-wall intersections. Water has penetrated behind the water-resistive barriers, or WRBs, and the area did not dry before it got wet again, leading to rapid deterioration.

Premolded, seamless, kick-out diverter flashings, such as the one shown in Image 3, are an excellent solution for reducing leaks at roof-wall intersections. The polypropylene product works well in cold and warm climates, can be used with any roof slope and costs about \$12.

Metal kick-out diverter flashings often are poorly field-fabricated (as shown in Image 4), which can lead to leaks.

2: Reverse Shingling

Another mistake made when working with housewraps is poor flashing design, which can lead to common errors, like reverse shingling. For example, Image 5 shows a horizontal valley where the roof meets the wall. The metal flashing is reverse-shingled over the brick. Proper inspection is required to avoid flashing-related leaks.

There is a gap between the step flashing and WRB in Image 6 because the WRB was improperly installed behind the step flashing. Any water that gets behind the siding will run down the housewrap and penetrate between the step flashing and housewrap, leading to a ceiling leak.

A solution to this is to treat your walls like roofs. Few contractors would install roof shingles without an underlayment or flashings and would never lap the bottom shingles over the shingle courses above. In the same way, walls always should be covered by a WRB. Then, the

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WRB should be installed “shingle fashion,” so the upper layers overlap lower layers and step flashings. In Image 7, a peel-and-stick flashing seals over the metal step flashing onto the sheathing. If any water gets behind the housewrap, it will run onto the peel-and-stick flashing to daylight. Image 8 illustrates a real-world, properly integrated kick-out diverter flashing with peel-and-stick flashing and housewrap.

3: Incomplete Coverage

Manufacturers often require that housewrap be overlapped approximately 12 inches at corners and, of course, sealed with an acrylic-backed tape. Often when installers roll on the WRB at inside corners, it is not tight to the inside wall, resulting in a small radius space between the WRB and sheathing. The cladding contractor then has to slit the WRB to install the cladding, which leaves a water-entry point. The rips and gaps pictured in Image 9 will allow water flowing behind the cladding to leak into the wall at the corners.



IMAGE 9

The rips and gaps in this housewrap will allow water flowing behind the cladding to leak into the wall at the corners.



IMAGE 10

The large gaps in the WRB at the roof-wall intersection certainly will lead to a failure. Housewraps should cover walls completely and be properly lapped to shed water.

The large gaps in the WRB at the roof-wall intersection in Image 10 certainly will lead to a failure. Housewraps should cover walls completely and be properly lapped to shed water. WRBs often are poorly installed at roof-wall intersections.

4: Wall Penetrations

Contractors should inspect housewraps for complete coverage to ensure all wall penetrations are flashed properly. For example, there is no flashing around the pipes coming through the wall in Image 11. It would be very easy for water to run down the pipes and flow directly into the wall. Image 12 shows poor detailing at the electric-meter base, which surely will lead to leaks. It only takes minutes for wall components to get wet, but it takes days, weeks or months for them to dry. If the wetting rate exceeds the drying rate, mold and decay can occur.

In addition, cutting holes that are larger than necessary (Image 13) to accommodate penetrations defeats the purpose of housewraps. The proper cutting technique is to cut slits in the wrap that are just large enough to allow for properly shingled flashing. Slide the penetration through the cut, and seal around the penetration with an approved tape or a peel-and-stick flashing before securing the face plate. Image 14 shows a prefabricated flashing device that stretches around the pipe and seals it.

5: Proper Fastening

Manufacturers offer recommendations for proper fastening of housewraps for a reason. In addition to their recommendations, it's a good idea to use wrap caps instead of staples for better sealing. Every staple through a WRB is a potential water leak. Image 15 illustrates over-fastening using staples.

6: Poor Window and Door Flashing

Window and door installations in remodels can be complicated. Windows and doors are holes in buildings that create hundreds of linear feet of cracks where water can easily penetrate. Most water leaks occur at windows and doors because of improper flashing. There is an enormous amount of confusion in the field about the correct way to flash windows and doors. The No. 1 problem I see relates to flashing sequence.



IMAGE 11

The lack of flashing around the pipes coming through this wall will allow water to run down the pipes and flow directly into the wall.



IMAGE 12

Poor detailing at the electric-meter base will eventually lead to leaks.

It is important for installers to follow ASTM E2112 and the window or door manufacturer's flashing instructions. The following is the proper sequencing to install a window or door flashing:

- **Step 1:** When the WRB is a wrap, it should be installed before the window or door. Image 16 illustrate a proper installation while Image 17 is improper. Begin with a sill flashing that covers the rough sill and has a bottom flap that laps over the top of the housewrap. This will ensure any water that leaks through the window/door drains out over the WRB.
- **Step 2:** Sealant should be applied at the head and jamb areas. Then the window/door can be installed. Jamb flashing can go in after the win-



IMAGE 13

Cutting holes that are larger than necessary to accommodate penetrations, like this vent, defeats the purpose of a housewrap.



IMAGE 14

A prefabricated flashing device stretches around pipes and seals them. This product is manufactured by QuickFlash.



IMAGE 15

A housewrap can be over-fastened. Every staple through a WRB is a potential water leak. Wrap caps are a better option.

There is an enormous amount of confusion in the field about the correct way to flash windows and doors. The No. 1 problem I see relates to flashing sequence.

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IMAGE 16

The sill flashing was correctly installed before the window.



IMAGE 17

The sill flashing is improperly applied over the top of the nail fin below the window. In a correct installation, the sill flashing should be installed before the window.



IMAGE 18

Proper sequencing will ensure a window is watertight. In this final step of installation, the head flashing should be installed from the nail fin at the window head onto the wall sheathing.

dow has been installed. It should lap over the window/door flange to prevent wind-driven water from getting past the window/door into the rough opening.

- **Step 3:** Install head flashing from the nail fin at the window/door head onto the wall sheathing, which is illustrated in Image 18. Reinstall the housewrap over the head flashing.

7: Improper Head Flashing and Sealants

Image 19 depicts what water running down a wall “sees” as it approaches the head of the window. This reinforces how important it is to properly seal and flash at the window head. Sealant alone won’t keep water out. If the sealant ever separates and fails, there is an entry point for water. Always use compatible sealants and flashing.

The head flashing on the window in Image 20 is reverse lapped over the housewrap. Before applying the head flashing, a flap needs to be

cut in the housewrap so the head flashing can adhere directly from the nail fin at the window head onto the wall sheathing.

It pays to install materials correctly the first time. Your success does not depend on how much money you make; it depends on how much money you get to keep. Controlling call-back costs starts with taking a whole-system approach to water management. Ensure crews are well trained and have detailed checklists to follow that address each step to achieving proper moisture management. *EC*

Steve Easley is an internationally known construction consultant who specializes in solving building-science-related problems and providing best-practice training and seminars about high-performance building techniques. He can be reached at steve@steveeasley.com.



IMAGE 19

Water running down a wall “sees” an entry point as it approaches the head of a window. The window head must be properly sealed and flashed to avoid water entry.



IMAGE 20

The head flashing on the window is reverse lapped over the housewrap.