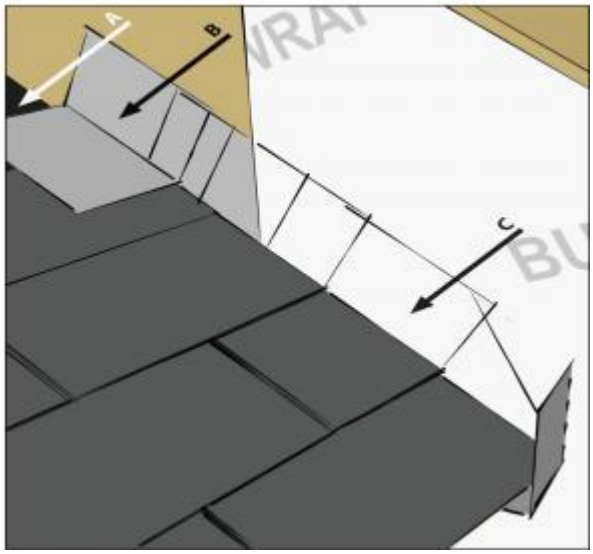
Building America Solution Center

https://basc.pnnl.gov/resource-guides/step-and-kick-out-flashing-roof-wall-intersections#block-views-guide-static-blocks-block-1

Scope



Water Managed Roof Assembly
Step and kick-out flashing at all roof-wall intersections extending >= 4 inches on wall surface above roof deck and integrated with drainage plane above.

A. Install roof felt prior to step and kick-out flashing.
B. Install step and kick-out flashing to extend at least 4 inches above the roof deck along the wall.
C. Install roofing shingles and building wrap over flashing.
D. If installing a metal and rubber membrane roof, install continuous flashing instead of step flashing.

ENERGY STAR Notes:
Intersecting wall siding shall terminate 1 inch above the roof or higher, per manufacturer's recommendations. Continuous flashing shall be installed in place of step flashing for metal and rubber membrane roofs.

Description

Deluging rains can pour thousands of gallons of water onto a home's roof in a single storm. In multi-level house designs where roofs intersect walls, much of this water is channeled along the wall to a gutter. If sidewall flashing is lacking or inadequate, water runoff can get inside the wall and cause serious damage. In big storm events, rainwater can often overflow the gutter and stream down the walls. Diverters are sometime fashioned onsite in an attempt to direct this water into the gutters. If undersized, these diverters are not very helpful. If not properly integrated with the existing housewrap and cladding, they can do more harm than good by allowing water inside the wall cavities. The result can be significant damage to wall sheathing, framing, and insulation, and mold inside the wall cavities. While older wood siding would show evidence of this water intrusion by peeling paint, new wall claddings like fiber cement, vinyl siding, and brick veneer can mask the evidence for years.

Anywhere roof sections adjoin wall sections, step flashing should be used to keep water from entering the walls, and kick-out diverters should be used to direct the rainwater into rain gutters where it can be carried away from the structure. Proper flashing that is correctly integrated with housewrap and cladding along roof-wall intersections and kick-out diverters that are seamless and adequately sized to direct flowing water into the rain gutters are important tools to keep the wall cladding from being saturated by flowing water.

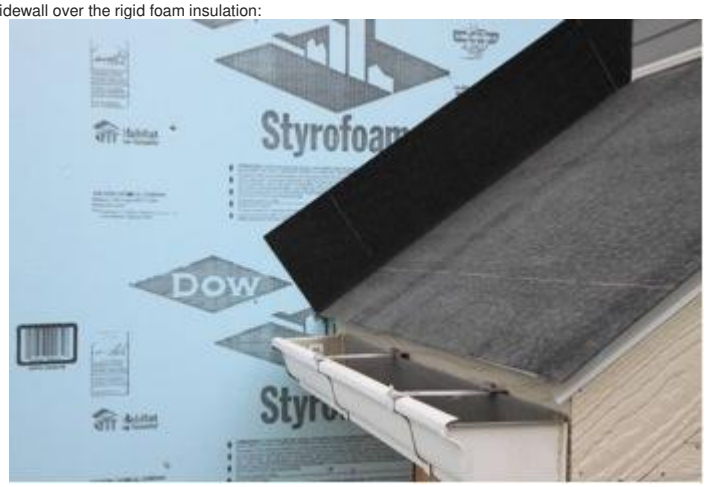
These materials would be installed by roofers in coordination with housewrap and siding installers. This task should be included in the contract for the appropriate trade depending on the workflow at the specific job site.Wall flashing and kick-out diverters are required in the 2009 and 2012 IRC (R703.8). See the "compliance" tab.

Figure 1 - Improper flashing can allow rain water into walls, causing significant damage

How to Install Sidewall Flashing and Kick-Out Diverters — On Homes with Rigid Foam Insulation Sheathing

1. Apply drip edge and roof underlayment over the roof deck and continue lapping up the sidewall and over the water-resistive barrier (in this case rigid foam insulation) a minimum of 7 inches.
2. Install the shingle starter strip at the roof eave in accordance with the roofing manufacturer's instructions.
3. a. Place the seamless, one-piece, non-corrosive kick-out diverter as the first piece of step flashing.
   b. Slide the kick-out diverter up the roof plane until the starter trough stops at the shingle starter strip. The diverter must be flat on the roof and flush to the sidewall.
   c. Fasten and seal the diverter to the roof deck and starter strip. (Do not fasten it to the sidewall.)
4. Place the first shingle and next section of sidewall flashing over the up-slope edge of the diverter, lapping a minimum of 4 inches over the diverter. (Sidewall flashing height requirement should be determined by a design professional and local building codes.)
5. Install the remaining sidewall flashing, appropriate counter flashing, and shingles in accordance with the manufacturer's instructions.
6. Apply self-adhesive flashing over the top edge of the wall flashing, diverter, and rigid foam insulation.
7. Apply construction tape over the self-adhered flashing.
8. Apply siding over the rigid foam insulation.

Step 1. Apply roof underlayment over roof deck and up the sidewall over the rigid foam insulation:



Step 2. Install shingle starter strip then kick-out diverter as first piece of step flashing:

Step 3. Place the first shingle and the next section of sidewall flashing over upper edge of diverter:

Step 4. Install remaining sidewall flashing, appropriate counter flashing, and shingles:

Step 5. Apply self-adhesive flashing over top edge of the wall flashing, diverter, and rigid foam insulation:

Step 6. Apply construction tape over the self-adhered flashing:

How to Install Sidewall Flashing and Kick-Out Diverters — On Homes with Housewrap over OSB or Plywood Sheathing

1. Apply drip edge and roof underlayment over the roof deck. Continue lapping up the sidewall and over the weather-resistive barrier (in this case housewrap) a minimum of 6 inches.
2. Install the shingle starter strip at the roof eave in accordance with the roofing manufacturer's instructions.
    a. Place the seamless one-piece non-corrosive kick-out diverter as the first piece of step flashing.
    b. Slide the kick-out diverter up the roof plane until the starter trough stops at the shingle starter strip. The diverter must be flat on the roof and flush to the sidewall.
    c. Fasten and seal the diverter to the roof deck and starter strip. (Do not fasten it to the sidewall.)
3. Place the first shingle and next section of sidewall flashing over the up-slope edge of the diverter, lapping a minimum of 4 inches over the diverter. (The sidewall flashing height requirement should be determined by a design professional and local building codes.)
4. Install the remaining sidewall flashing, appropriate counter flashing, and shingles in accordance with manufacturer's instructions.
5. Apply self-adhesive flashing over the top edge of the wall flashing, diverter, and housewrap.
6. Install the housewrap. Cut the housewrap to fit over the self-adhesive flashing and sidewall flashing.
7. Apply siding over the housewrap.

Step 1. Apply roof underlayment over roof deck and up the sidewall over housewrap:

Step 2. Install shingle starter strip then kick-out diverter; attach to roof deck but not sidewall:

Step 3. Place first shingle and next section of sidewall flashing over upper edge of diverter:

Step 4. Install remaining sidewall flashing, counter flashing, and shingles:

Step 5. Apply self-adhesive flashing over top edge of the wall flashing, diverter, and housewrap:

Step 6. Install the housewrap. Cut housewrap to fit over diverter and tape top of cut:

Compliance

ENERGY STAR Version 3, (Rev. 07)

Water Management Checklist, Water-Managed Roof Assembly. Step and kick-out flashing at all roof-wall intersections, extending >= 4” on wall surface above roof deck and integrated with drainage plane above. Intersecting wall siding shall terminate 1 in. above the roof or higher, per manufacturer's recommendations. Continuous flashing shall be installed in place of step flashing for metal and rubber membrane roofs.

DOE Zero Energy Ready Home

Exhibit 1: Mandatory Requirements. Certified under ENERGY STAR Qualified Homes Version 3.

AAMA 711-13

AAMA 711-13. Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products. Available from AAMA's online store from the link above. The specification establishes the test methods and minimum performance requirements for self adhering flashing products used around the perimeter of exterior fenestration products. It also provides a method to determine the minimum width of the flashing products and to evaluate the influence of the environmental factors on the installation of self adhering flashing products applied under typical field conditions.

2009 IRC

Section R703.8 Flashing. Approved corrosion-resistant flashing to be applied shingle-fashion to prevent water from entering into wall cavities or from penetrating into building structural framing components. Self-adhered flashing must comply with AAMA 711. Flashing at exterior window and door openings must extend to the surface of the exterior wall finish or to the water-resistive barrier. Corrosion-resistant flashings should be installed:

Exterior and window door openings and extend to the exterior wall finish surface or water-resistive barrier

At intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings

Under and at ends of masonry, wood, or metal copings and sills

Continuously above all projecting wood trim

Where exterior porches, decks, or stairs attach to a wall or floor assembly (wood-frame construction)

At wall and roof intersections

At built-in gutters.*

2012 IRC

Section R703.8 Flashing. Approved corrosion-resistant flashing to be applied shingle-fashion to prevent water from entering into wall cavities or from penetrating into building structural framing components. Self-adhered flashing must comply with AAMA 711. Flashing at exterior window and door openings must extend to the surface of the exterior wall finish or to the water-resistive barrier. Flashing must be installed at the following locations:

Exterior window and door openings

In accordance with fenestration manufacturer's installation and flashing instructions or in accordance with the flashing manufacturer's instructions. Where instructions or details aren't provided, pan flashing is to be installed at the sill of exterior window and door openings and must be sealed or sloped to direct water to the surface of the exterior wall finish or water-resistive barrier. Openings using pan flashing must also incorporate flashing or protection at the head and sides.

Per the flashing design or method of a registered design professional.

Under other approved methods.

Exterior and window door openings and extend to the exterior wall finish surface or water-resistive barrier

At intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings

Under and at ends of masonry, wood, or metal copings and sills

Continuously above all projecting wood trim

Where exterior porches, decks, or stairs attach to a wall or floor assembly (wood-frame construction.

At wall and roof intersections

At built-in gutters.*

*Due to copyright restrictions, exact code text is not provided. For specific code text, refer to the applicable code.