

Step and Kick-Out Flashing at Roof-Wall Intersections

Last Updated: 03/15/2017

Scope



Step and kickout flashing should be installed at all roof-wall intersections to protect the wall and divert rainwater runoff into a gutter.

Install step and kick-out flashing at all roof-wall intersections to protect walls from water intrusion and install boot or collar flashing at all roof penetrations to protect roofs from leaks.

- Install corrosion-resistant flashing pieces that are overlapped shingle fashion.
- Extend step flashing at least 4 inches up the wall from the roof deck and at least four inches out along the roof deck (IRC 2015) and integrate the flashing with the drainage plane above (for example, overlap house wrap over it).
- If metal, the flashing should be made of galvanized steel at least 0.019-inches thick (IRC 2015).
- Install roof felt prior to installing the step and kick-out flashing.
- Install house siding over the step flashing, ending at least one inch above the roof surface.
- Install shingles over the portion of step flashing on the roof.
- When installing metal or rubber membrane roofs, use continuous flashing rather than pieces of step flashing.
- Install kick-out flashing at the end of a roof-wall intersection to divert water away from the wall and into gutters. Ensure that the kick-out flashing is large enough to handle expected storm water flows.
- Install boot or collar flashings around all roof penetrations and properly integrate with roof membranes and shingles above and below the penetration.

See the [Compliance Tab](#) for related codes and standards requirements, and criteria to meet national programs such as DOE's Zero Energy Ready Home program, ENERGY STAR Certified Homes, and Indoor airPLUS.

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. Kick-out diverters can be formed on site from sheet metal but these are often inadequately sized and have unsealed seams that fail over time. Large, seamless, plastic kick-out diverters are commercially available.

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) and 2015 IRC (R703.4). 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-resistant barrier (in this case rigid foam insulation) a minimum of 7 inches (Figure 2).
2. Install the shingle starter strip at the roof eave in accordance with the roofing manufacturer's instructions (Figure 3).
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 (Figure 3).
 - c. Fasten and seal the diverter to the roof deck and starter strip. (Do not fasten it to the sidewall.)
4. Place the first row of shingles and next section of sidewall flashing over the up-slope edge of the diverter, lapping a minimum of 4 inches over the diverter (Figure 4). 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 (Figure 5).
6. Apply self-adhesive flashing over the top edge of the wall flashing, diverter, and rigid foam insulation (Figure 6).
7. Apply construction tape over the self-adhered flashing (Figure 7).
8. Apply siding over the rigid foam insulation.



Figure 2. Apply roof underlayment over roof deck and up sidewall over the rigid foam insulation.



Figure 3. Install shingle starter strip then kick-out diverter as first piece of step flashing.



Figure 4. Place the first row of shingles and the first piece of flashing over the upper edge of the diverter.



Figure 5. Install remaining sidewall flashing and roof shingles.



Figure 6. Apply self-adhesive flashing over the top edge of the wall flashing, the diverter, and the rigid foam insulation.



Figure 7. 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 (Figure 8). 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 (Figure 9).

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 as shown in Figure 10. (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 (Figure 11).
5. Apply self-adhesive flashing over the top edge of the wall flashing, diverter, and housewrap (Figure 12).
6. Install the housewrap. Cut the housewrap to fit over the self-adhesive flashing and sidewall flashing (Figure 13).
7. Apply siding over the housewrap.



Figure 8. Apply roof underlayment over roof deck and up the sidewall over housewrap.



Figure 9. Install shingle starter strip then kick-out diverter; attach to roof deck but not sidewall.



Figure 10. Place first shingle and next section of sidewall flashing over upper edge of diverter.



Figure 11. Install remaining sidewall flashing, counter flashing, and shingles.



Figure 12. Apply self-adhesive flashing over top edge of the wall flashing, diverter, and housewrap.



Figure 13. Install the housewrap. Cut housewrap to fit over diverter and tape top of cut.

Ensuring Success

The site supervisor should visually inspect the step flashing and kickout diverter during installation by trades to ensure that it is properly integrated with other wall and roof elements.

Climate

Verify that the kickout diverter is sized appropriately for expected local storm events.

Training

Right and Wrong Images



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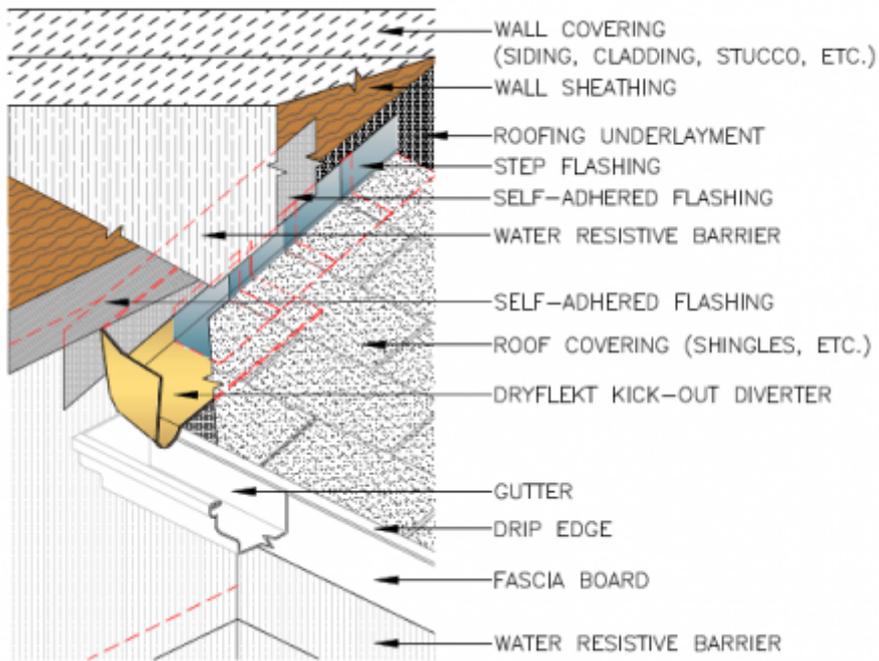


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CAD



CAD FILE: [dryflekt-diverter-detail-installation-ver3.dwg](#)

PDF: [dryflekt-diverter-detail-installation-ver3.pdf](#)

Compliance

The Compliance tab contains both program and code information. Code language is excerpted and summarized below. For exact code language, refer to the applicable code, which may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our [webmaster](#) if you find broken links.

[ENERGY STAR Certified Homes](#)

ENERGY STAR Certified Homes (Version 3/3.1, Revision 08), Water Management System Builder Requirements:

3. Water-Managed Building Materials:

3.1 Step and kick-out flashing at all roof-wall intersections, extending ? 4" on wall surface above roof deck and integrated shingle-style with drainage plane above; boot / collar flashing at all roof penetrations.¹²

Footnotes:

(12) 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.

Builders Responsibilities: It is the exclusive responsibility of builders to ensure that each certified home is constructed to meet these requirements. While builders are not required to maintain documentation demonstrating compliance for each individual certified home, builders are required to develop a process to ensure compliance for each certified home (e.g., incorporate these requirements into the Scope of Work for relevant sub-contractors, require the site supervisor to inspect each home for these requirements, and / or sub-contract the verification of these requirements to a Rater). In the event that the EPA determines that a certified home was constructed without meeting these requirements, the home may be decertified.

ENERGY STAR Revision 08 requirements are required for homes permitted starting 07/01/2016.

[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.

2015 and 2018 IRC

Section R703.4 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 must be installed at ...wall and roof intersections and at built-in gutters.

Retrofit: 2009, 2012, 2015, and 2018 IRC

Section N1101.3 (Section N1107.1.1 in 2015 and 2018 IRC). Additions, alterations, renovations, or repairs shall conform to the provisions of this code, without requiring the unaltered portions of the existing building to comply with this code. (See code for additional requirements and exceptions.)

Appendix J regulates the repair, renovation, alteration, and reconstruction of existing buildings and is intended to encourage their continued safe use.

More Info.

Access to some references may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our [webmaster](#) if you find broken links.

Case Studies

1. [New Whole-House Solutions Case Study: Imagine Homes: Stillwater Ranch, San Antonio, TX](#)
(893KB)
Author(s): PNNL
Organization(s): PNNL
Publication Date: April, 2012
Case study about a new home builder that strives to address health, safety, and durability issues in a hot and humid climate.

References and Resources*

1. [Best Practices Manual](#)
Author(s): Hammer & Hand
Organization(s): Hammer & Hand
Publication Date: February, 2018
This Best Practices Manual is the product of Hammer & Hand's ongoing work to document and internally codify our standard operating procedures for construction practice.
2. [Building America Best Practices Series Volume 11: 40% Whole-House Energy Savings in the Marine Climate](#)
Author(s): Baechler, Gilbride, Hefty, Cole, Williamson, Love
Organization(s): Pacific Northwest National Laboratory, Oak Ridge National Laboratory
Publication Date: September, 2010
Report providing builders in marine climates with guidance for building homes that have whole-house energy savings of 40% over the Building America benchmark with no added overall costs for consumers.
3. [DOE Zero Energy Ready Home National Program Requirements](#)
Author(s): Department of Energy
Organization(s): DOE
Publication Date: April, 2017
Standard requirements for DOE's Zero Energy Ready Home national program certification.
4. [ENERGY STAR Certified Homes, Version 3 \(Rev. 08\) National Program Requirements](#)
Author(s): U.S. Environmental Protection Agency
Organization(s): EPA
Publication Date: December, 2015
Webpage with links to Document outlining the program requirements for ENERGY STAR Certified Homes, Version 3 and 3.1 (Rev. 08).
5. [Water Management Details for Residential Building \(Housewraps/Flashing/Windows\)](#)
Author(s): Building Science Corporation
Organization(s): Building Science Corporation
Publication Date: November, 2007
Document providing guidance on water management concepts and applications.
6. [Water Management System Builder Checklist Guide](#)
Author(s): U.S. Environmental Protection Agency
Organization(s): EPA
Publication Date: February, 2011
Guide describing details that serve as a visual reference for each of the line items in the Water Management System Builder Checklist.

*Publication dates are shown for formal documents. Dates are not shown for non-dated media. Access dates for referenced, non-dated media, such as web sites, are shown in the measure guide text.

Contributors to this Guide

The following authors and organizations contributed to the content in this Guide.

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