

# Measure Guideline: Water Management at Tub and Shower Assemblies

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*IBACOS, Inc.*

December 2011

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## **Measure Guideline: Water Management at Tub and Shower Assemblies**

Prepared for:

Building America

Building Technologies Program

Office of Energy Efficiency and Renewable Energy

U.S. Department of Energy

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Task Order KNDJ-0-40341-02

December 2011

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*\* Unless otherwise noted, all figures were created by IBACOS.*

## Definitions

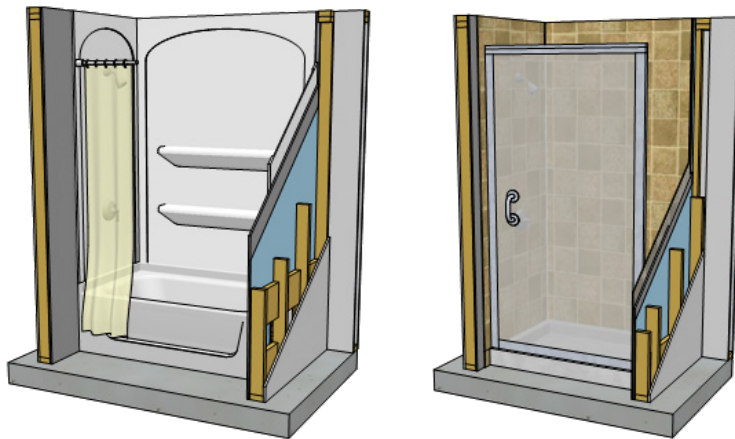
Backerboard	A water-durable, mold-resistant panel for use under tile and other finishes in a variety of interior and exterior applications.
Caulking	A material used to seal areas of potential air or water leakage into or out of a building assembly.
Flashing	A thin continuous sheet of metal, plastic, rubber, or waterproof paper used to prevent the passage of water through a joint in a wall, roof, or other building assembly.
Gut Rehab	A major restoration project on a house or other building, ripping out plaster walls back to the studs and rafters and replacing them along with some or all of the trim, windows and doors, plumbing and electrical systems, exterior siding, roof, etc.
Nailing Flange	A plastic apron-like piece that extends above a tub deck or shower pan that enables the fixture to be fastened to framing.
Shower Pan/ Receptor	A preformed single piece of molded acrylic plastic that is used in place of a shower base liner. The pan is designed with sidewalls and a sloped floor that contains and directs water to a drain that is molded into the pan.
Waterproof	A coating capable of stopping penetration of water or moisture.
Wick	To absorb or draw off (liquid) by capillary action.



## Executive Summary

When conducting a total gut rehab of a structure or constructing a new home, best practice installation and detailing for effective waterproofing are critically important at bathtub and shower assemblies. Water management issues in a structure may go unrecognized for long periods, so that when they are finally observed, the damage from long-term water exposure is extensive. A gut rehab is often undertaken when a home has experienced a natural disaster or when the homeowners are interested in converting an old, high-energy-use building into a high-quality, efficient structure that meets or exceeds one of the national energy standards, such as ENERGY STAR or LEED for homes.

During a gut rehab, bath areas need to be replaced with diligent attention to detail. Employing effective water management practices in the installation and detailing of tub and shower assemblies will minimize or eliminate water issues within the building cavities and on the finished surfaces. A residential tub-and-shower surround or shower-stall assembly is designed to handle a high volume of water—2.5 gallons per minute, with multiple baths occurring during a typical day (see Figure 1). Transitions between dissimilar materials and connections between multiple planes must be installed with care to avoid creating a pathway for water to enter the building assemblies. Due to the high volume of water and the consequential risk of water damage to the home's structure, a comprehensive water management system is imperative to protect the building assemblies underlying the finish surround of tub and shower areas. At each stage of construction, successive trades must take care not to create a defect nor to compound or cover up a previous trade's defect. Covering a defect hides the inevitable point of failure and may even exacerbate the situation.



**Figure 1. Typical shower and tub with surround and tiled shower stall**

# **1 What Is Covered in This Measure Guide**

This measure guide covers the fundamental waterproofing strategies for tub and shower assemblies. These best practices of detailing and installation will minimize or eliminate water issues in bath areas. Although many bath assemblies are available, this guide demonstrates methods applicable to two of the most common styles installed in today's homes. The two installations covered in this guide are a combined tub and shower unit with a three-piece acrylic surround and a standalone shower stall with a preformed acrylic base and tile surround.

## **1.1 Audience for This Measure Guide**

This measure guide will benefit homeowners, tile installers, plumbing contractors, retrofit contractors, architects, and material suppliers.

## **1.2 Industry Relevance for This Measure Guide**

Whether the remodeling efforts in the bath or shower area are the result of a natural disaster, a gut rehab retrofit, or a simple upgrade and improvement of the existing bath, implementing effective waterproofing strategies beneath the finish surround will ensure a trouble-free and durable bath assembly for homeowners.

## 2 Common Practice and Inherent Risk Issues

In the residential construction industry, the myth persists that the finish surround on a bathtub or shower wall is 100% waterproof and that no additional detailing is necessary to prevent water from entering the underlying wall and floor assemblies. Although backerboards are waterproof or water resistant, the many material transitions between the backerboard, the finish surround, and the door assembly are prone to water entry and subsequent damage to the finished surfaces and framing.

A common—but ill-advised—practice when retrofitting an existing tub or shower surround is to install the backerboard directly over the nailing flange, with the bottom edge of the backerboard sitting directly on the tub or the shower pan (see Figure 2). The direct contact between the shower pan and backerboard could lead to the backerboard wicking up any water that gets past the finish surround. Over time, continuous wicking will cause the tile or acrylic surround to loosen at the base and wick moisture toward the underlying framing. It is important not to assume that the caulking at the base of the surround panels is 100% tight at all times. Even if the caulking has deteriorated, the waterproofing strategy described in Section 3 should be effective enough to prevent water entry.



**Figure 2. Backerboard material installed tight to the tub**

Another very common practice is to install the backerboard above the nailing flange without any protection between the two materials (see Figure 3). If the shower pan is located on an exterior wall, the gap between the pan and the backerboard will form a direct path for any water penetrating the grout joints to get to the framing components and insulation (see Figure 4).



**Figure 3. Acrylic shower pan with the backerboard installed above the nailing flange**



**Figure 4. Gap between the backerboard and shower pan nailing flange that will be a direct water entry path into the wall assembly**

To minimize the potential of water-related issues in shower and tub assemblies, it is best to implement a comprehensive flashing and waterproofing strategy before installing the finish surround. The waterproofing strategy described in Section 3 will protect the underlying framing and building components from water damage.

### 3 Waterproofing Procedure

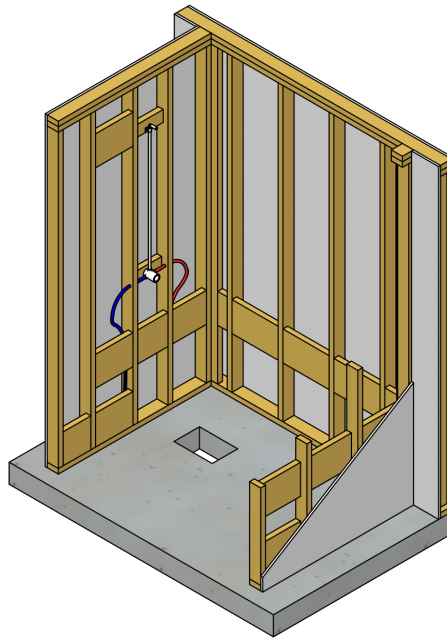
In both of these common retrofits, all of the plaster or wallboard has been removed to expose the framing as part of a gut rehab. In the first retrofit (Section 3.1), the homeowner is having a combination bathtub-and-shower unit installed. In the second strategy (Section 3.2), the homeowner is having a preformed acrylic shower receptor installed, with ceramic tile as the finish surround.

#### 3.1 Bathtub-and-Shower Unit Procedure

One of the most critical areas to detail is the transition from the nailing flange of the bathtub to the framing. The first step toward a successful retrofit is to install blocking between the framing members surrounding the tub (see Figure 5). Blocking must be wide enough to allow full adhesion of the butyl-based self-stick flashing to the nailing flange and blocking (minimum 2 in. × 6-in. blocking is recommended). Make certain that the faces of the blocking pieces are flush with the narrow faces of the studs, forming a smooth plane to which the flashing can be attached. The following best practice procedure will ensure an effective waterproofing strategy:

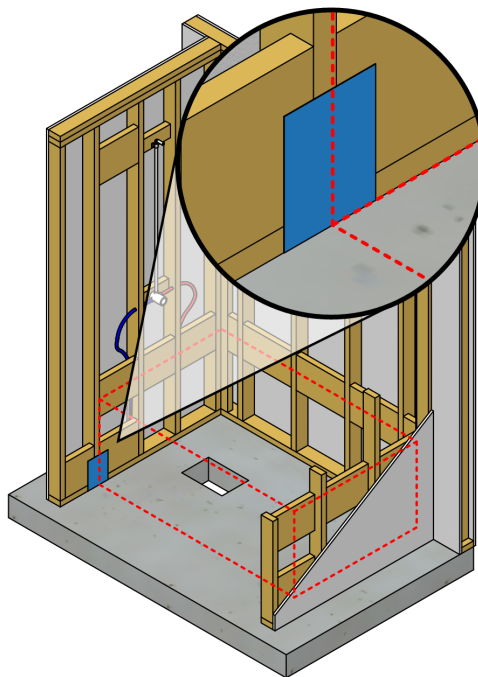
1. Install a minimum 6-in.<sup>2</sup> piece of self-stick flashing at the front bottom corners of the pan or tub (see Figure 6). This initial piece of flashing protects the vulnerable bottom corners of the framing from water intrusion.
2. Install the bathtub, being careful not to damage the previously installed flashing at the bottom front corners (see Figure 7).
3. Install a single piece of flashing that is folded into the corners over the nailing flange and to the blocking at both corners (see Figure 8).
4. Install a minimum 4-in. wide piece of self-stick flashing to the blocking and over the nailing flange around all three sides of the tub (see Figure 9).
5. Install a weather-resistant barrier, such as house wrap or 15-lb. building paper, over the framing, making sure to overlap the previously installed flashing at the nailing flange to maintain the shingling effect (see Figure 10).
6. Fasten the approved wet-area backerboard, following the manufacturer's recommended fastening schedule, to the framing in the tub area that will be covered by the surround. Do not set the backerboard directly onto the tub unit. Install the backerboard on the top edge of the nailing flange or, at a minimum, make certain to maintain a minimum ½ in. clear space between the tub deck and the bottom of the backerboard to prevent moisture wicking (see Figure 11).
7. Install the surround panels, making certain to follow the manufacturer's requirements for proper adhesion, temporary bracing, and caulking (see Figure 12).

Figure 13 shows the proper layering of the waterproofing and finish details.



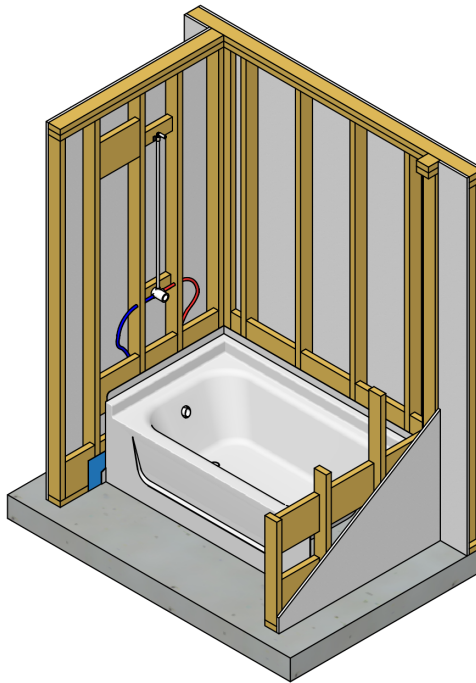
**Figure 5. Install blocking between the wall framing members where the shower or tub nailing fin is located.**

The blocking must be wide enough to allow full adhesion of the straight flashing to the nail fin and blocking. Make certain that the faces of the blocking pieces are flush with the narrow faces of the studs, forming a smooth plane to which the flashing can be attached.

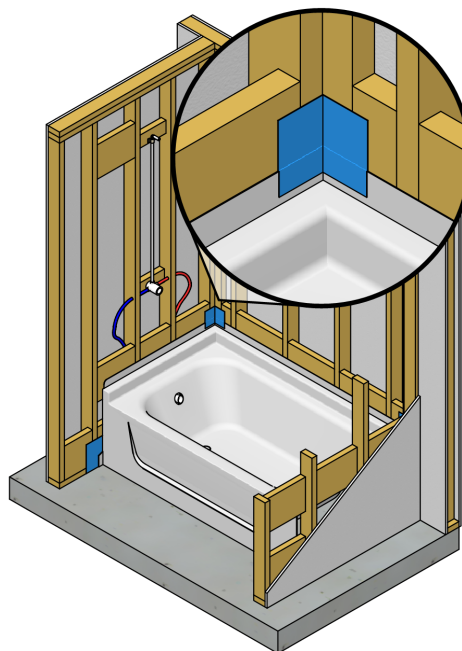


**Figure 6. Install a minimum 6-in.<sup>2</sup> piece of self-stick flashing at the front bottom corners of the pan.**

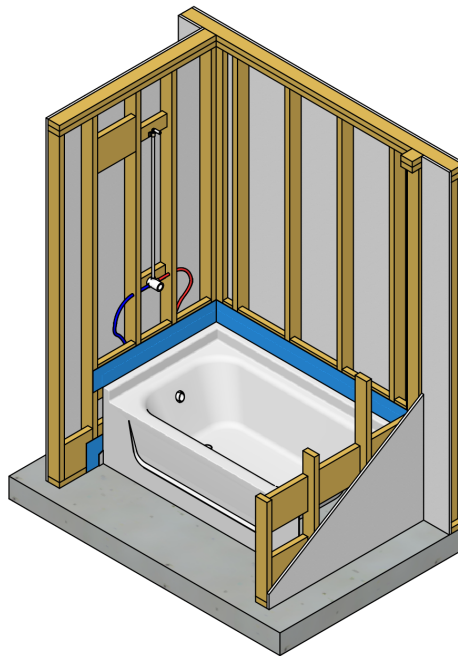




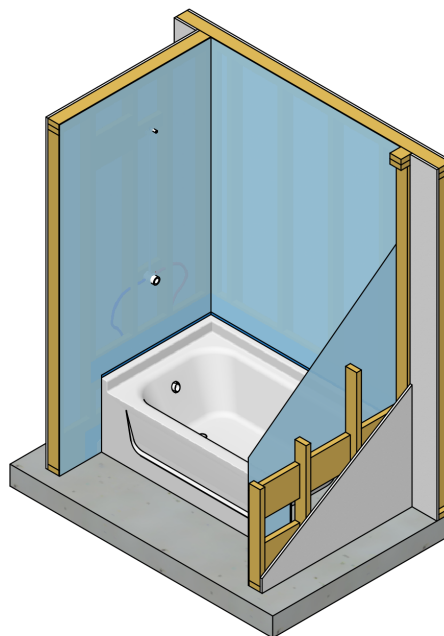
**Figure 7. Install the bathtub, being careful not to damage the flashing at the front bottom corners.**



**Figure 8. Install a single piece of flashing that is folded into the corners over the nailing flange and to the blocking at both corners.**

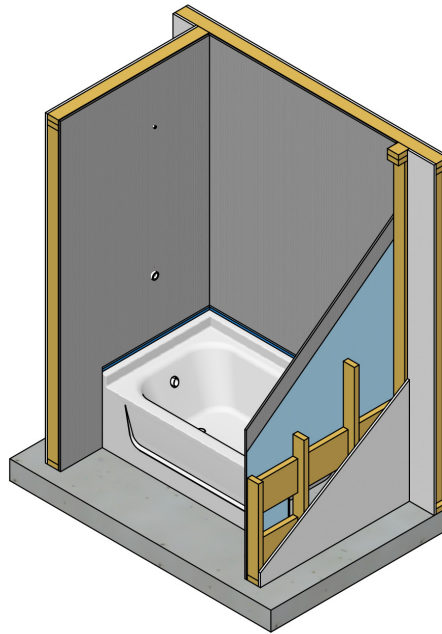


**Figure 9. Install a minimum 4-in. wide piece of self-stick flashing to the blocking and over the nailing flange around all three sides of the tub.**

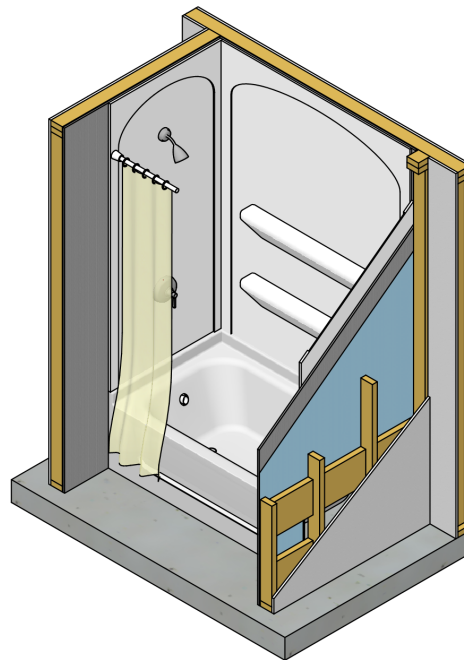


**Figure 10. Install a weather-resistant barrier, such as house wrap or 15-lb. building paper, over the framing, making sure to overlap the flashing at the nailing flange to maintain the shingling effect.**

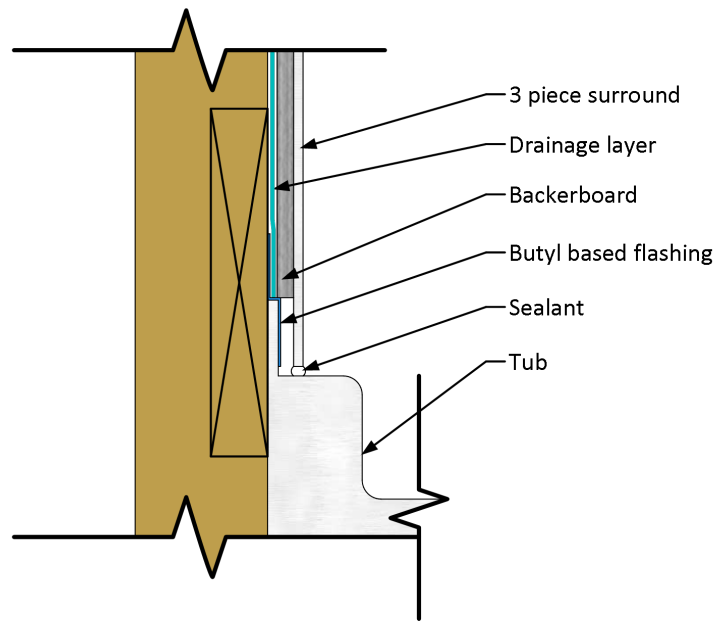




**Figure 11.** Fasten the approved wet-area backerboard, following the manufacturer's recommended fastening schedule, to the framing in the tub area that will be covered by the surround. Do not set the backerboard directly on the tub unit. Install the backerboard on the top edge of the nailing flange, or, at a minimum, make certain to maintain a minimum ½-in. clear space between the tub deck and the bottom of the backerboard to prevent moisture wicking.



**Figure 12.** Install the wall surround panels, making certain to follow the manufacturer's requirements for proper adhesion, temporary bracing, and caulking.



**Figure 13. Section showing the proper layering of the waterproofing and finish details.**

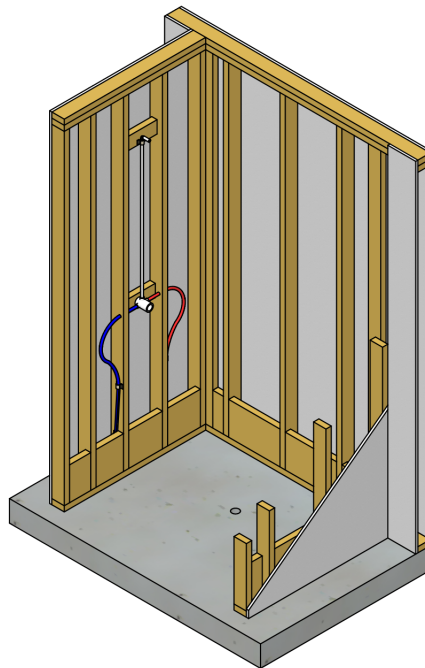
### 3.2 Tiled Shower Stall Procedure

Before applying the tile substrate, it is critical to implement a comprehensive flashing strategy so that any water that penetrates through the grout joints or through transitions between materials cannot reach the vulnerable framing and lead to long-term water damage. The first step toward a successful retrofit is to install blocking between the framing members surrounding the shower pan (see Figure 14). Make sure the blocking is wide enough to allow for complete adhesion of the 4-in. wide butyl-based, self-stick flashing to the wood blocking and over the nailing flange of the pan (minimum 2-in.  $\times$  10-in. blocking is recommended). Make certain that the faces of the blocking pieces are flush with the narrow faces of the studs, forming a smooth plane to which the flashing can be attached. The following best practice procedure will ensure an effective waterproofing strategy:

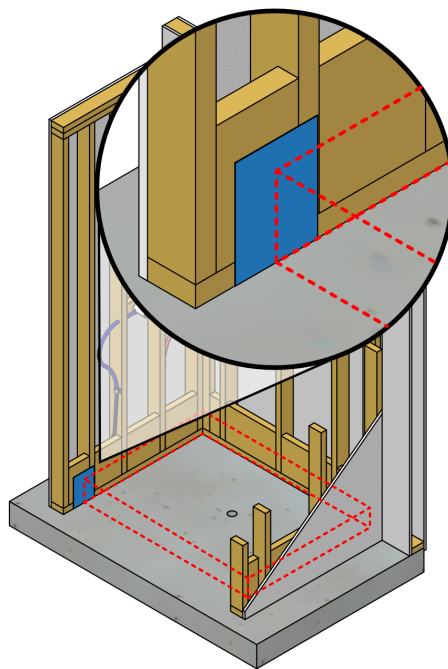
1. Install a minimum 6-in.<sup>2</sup> piece of self-stick flashing at the front bottom corners of the pan (see Figure 15). This initial piece of flashing protects the vulnerable bottom corners of the framing from water intrusion.
2. Install the shower pan, being careful not to damage the flashing at the bottom front corners (see Figure 16).
3. Install a single piece of flashing that is folded into the corners over the nailing flange and to the blocking at both corners (see Figure 17).
4. Install a minimum 4-in. wide piece of self-stick flashing to the blocking and over the nailing flange around all three sides of the shower pan (see Figure 18).

5. Install a weather-resistant barrier, such as house wrap or 15-lb. building paper, over the framing, making sure to overlap the flashing at the nailing flange to maintain the shingling effect (see Figure 19).
6. Install the approved wet-area backerboard on top of the nailing flange. Do not set the backerboard directly onto the shower pan deck. Install the backerboard on the top edge of the nailing flange or, at a minimum, make certain to maintain a minimum  $\frac{1}{2}$  in. clear space between the shower pan deck and the bottom of the backerboard to prevent moisture wicking from the shower pan deck into the backerboard. Make certain to follow the manufacturer's recommended fastening schedule for the approved backerboard (see Figure 20).
7. Seal all joints and corners in the backerboard with a minimum 2-in. wide fiberglass mesh tape, embedded in thinset adhesive (see Figure 21).
8. When installing the tile finish, make certain to keep the weep holes on the shower pan clear of grout in order to maintain an exit path for any moisture that penetrates the tile assembly or any water that drains down the backerboard (see Figure 22).

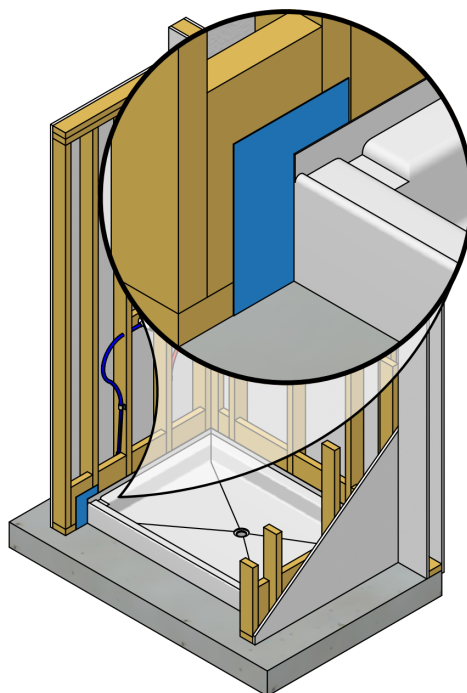
See Figure 23 for a section detail of the waterproofing and finish layers.



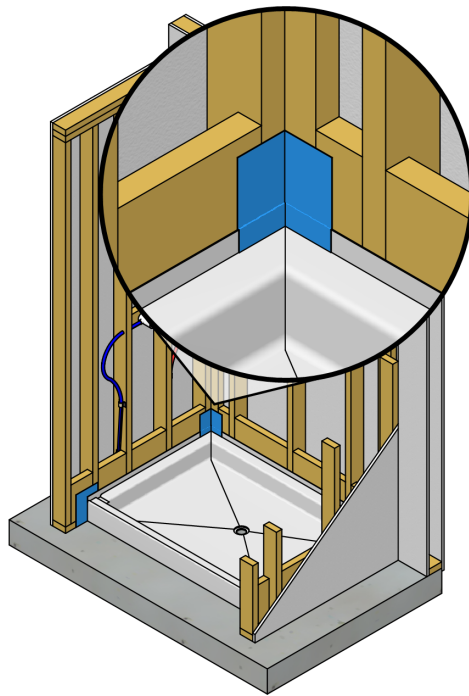
**Figure 14. Install blocking between the framing members surrounding the shower pan. The blocking must be wide enough to allow full adhesion of the straight flashing to the nail fin and blocking.**



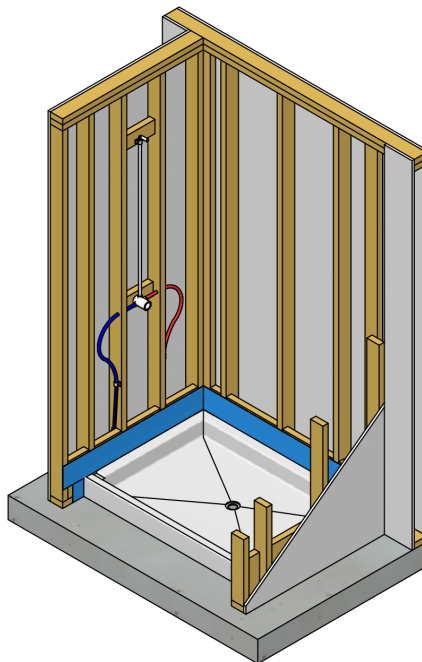
**Figure 15.** Install a minimum 6-in.<sup>2</sup> piece of self-stick flashing at the front bottom corners of the pan.



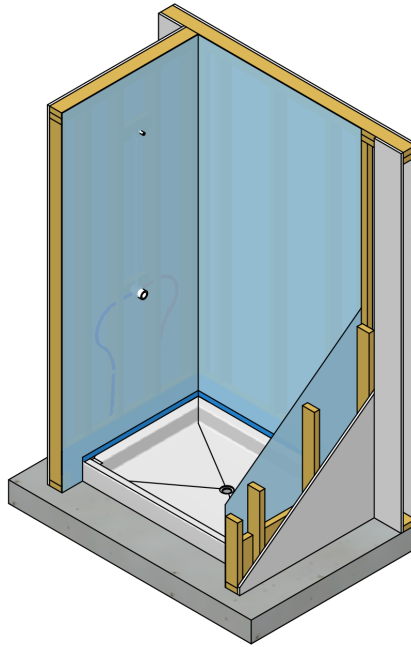
**Figure 16.** Install the shower pan, being careful not to damage the flashing at the front bottom corners.



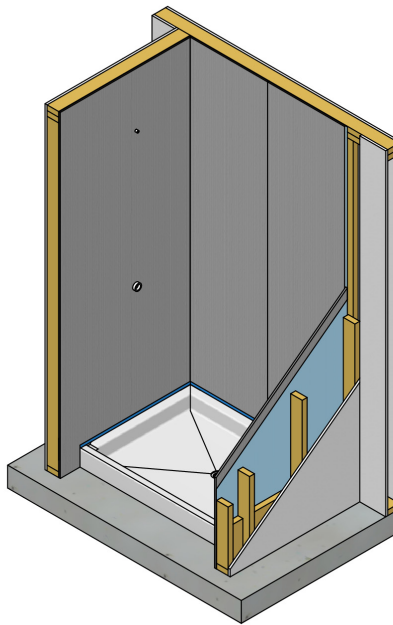
**Figure 17. Install a single piece of flashing that is folded into the corners over the nailing flange and to the blocking at both corners.**



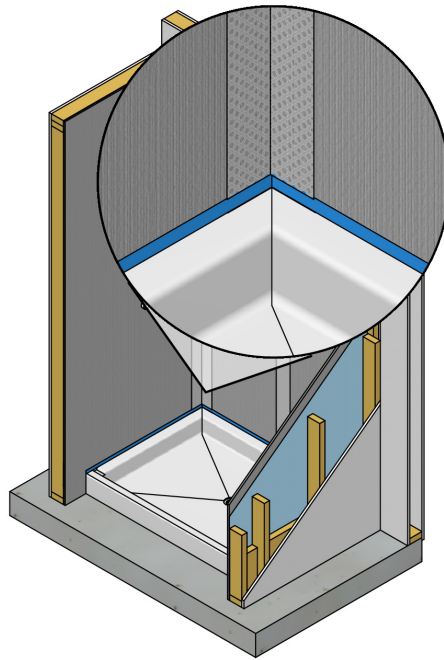
**Figure 18. Install a minimum 4-in. wide piece of self-stick flashing to the blocking and over the nailing flange around all three sides of the shower pan.**



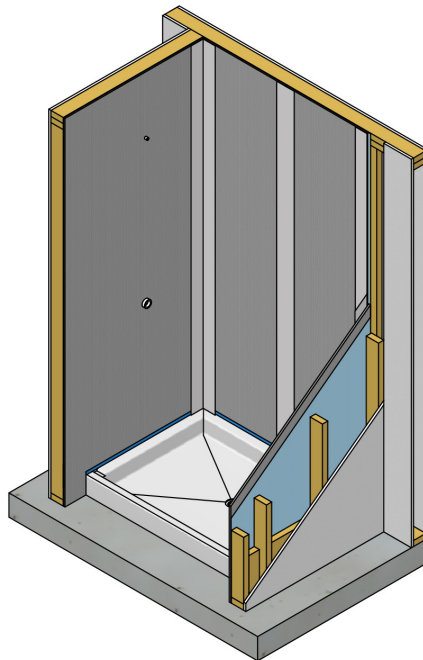
**Figure 19.** Install a weather-resistant barrier, such as house wrap or 15-lb. building paper, over the framing, making sure to overlap the flashing at the nailing flange to maintain the shingling effect.



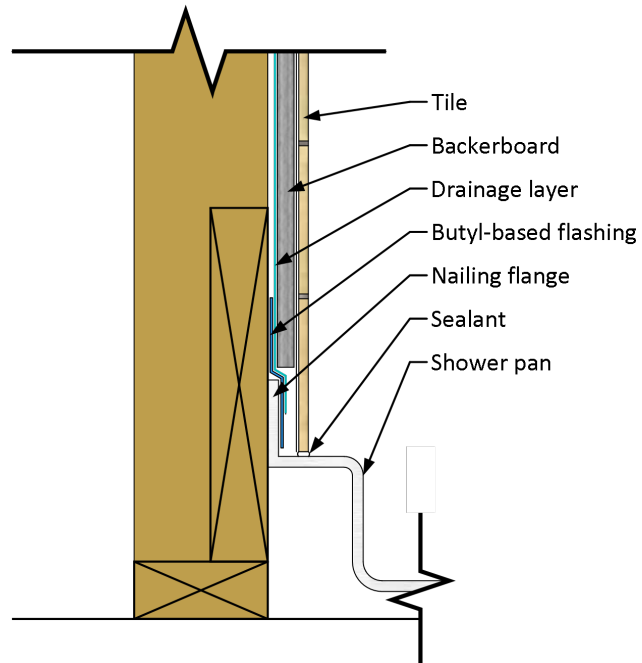
**Figure 20.** Install the approved wet-area backerboard on top of the nailing flange, following the manufacturer's recommended fastening schedule. Do not set the backerboard directly onto the shower pan deck. Do not set the backerboard directly on the shower pan ledge. Install the backerboard on the top edge of the nailing flange, or maintain a minimum 1/2-in. clear space between the shower pan deck and the bottom of the backerboard to prevent moisture wicking.



**Figure 21. Seal all joints and corners in the backerboard with a minimum 2-in. wide fiberglass mesh tape, embedded in thinset adhesive.**



**Figure 22. Install the tile, making sure to keep the weep holes in the pan clear to maintain an exit path for any moisture that penetrates the tile assembly and any water that drains down the backerboard.**



**Figure 23. Section showing the proper layering of the waterproofing and finish details.**



## **4 Selection Criteria for Maximum Building Durability**

### **4.1 Performance**

The use of high-quality butyl-based self-stick flashing products to protect all building assemblies from water will minimize the potential for long-term moisture damage and any occurrence of mold issues in the wet areas of bathrooms.

Installing a drainage plane material beneath all backerboards in shingle fashion will protect framing from moisture damage and potential mold issues.

### **4.2 System Interactions**

The waterproofing methods described in this guide lend themselves to long-term building durability and do not have any direct interactions with other house systems.

### **4.3 Cost Effectiveness**

The costs associated with implementing the waterproofing methods outlined in this guide should be minimal due to the small quantity of material needed and the relatively minimal amount of labor to install.

### **4.4 Codes and Standards**

There are no applicable building codes or standards that apply to the waterproofing details outlined in this guide. Building codes prohibit using water-resistant sheetrock (green board) in a shower enclosure. Instead, use fiber cement, fiber-mat reinforced cement, glass mat gypsum backers, and fiber-reinforced gypsum backers.

## **5 Homeowner Awareness and Education**

It is best to educate the homeowners about the effects of water on unprotected building materials in the bathroom and the importance of drying any areas outside of the shower and tub to minimize these effects. The importance of the weep holes and ensuring that those holes remain unsealed to provide drainage should be discussed with the homeowners.

## References

International Residential Code® (2009). 2009 International Residential Code® for One- and Two-Family Dwellings. Country Club Hills, IL: International Code Council; Chapter 7.

TCA 2006. *2006 Handbook for Ceramic Tile Installation*. Anderson, SC: Tile Council of North America.

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