

## Chapter 9: SIP Finish Material and Detailing

### In This Chapter

- Attaching siding
- Detailing for moisture protection
- Interior finishes
- Roofing

### Introduction

This chapter covers the application of siding, roofing and interior finishes. With exterior finishes such as brick, siding or roofing, the primary goal is to protect the SIP building envelope from bulk water. Many of the moisture protection strategies discussed in this chapter are explained in greater detail in both Chapter 4 and the *Builder's Guide to Structural Insulated Panels (SIPs)* by Joseph Lstiburek. Although detailing methods vary by geography and climate, all exterior finishes need to drain water away from the structure and facilitate drying.

#### Definitions

<b>Reservoir claddings:</b>	Exterior cladding materials such as wood siding, stone veneer, and fiber cement that have the ability to store water
<b>Drainage mat:</b>	Woven plastic mesh installed between the weather-resistive barrier and siding to create an air space
<b>Back ventilating:</b>	Providing an air space between exterior claddings and the weather-resistive barrier
<b>Vented roofing or cool roof:</b>	Roof assembly with a vented air space separating roofing material from the roof sheathing
<b>Shingle ridging:</b>	Buckling of asphalt shingles along joints in roof sheathing or SIP roof panels

## Wall Cladding and Siding

### Moisture Concerns

SIP walls can accept any type of wall cladding commonly used in wood frame construction. Many popular cladding materials are considered reservoir claddings, including wood siding, cedar shingles, fiber cement siding, stucco and manufactured stone veneer. Reservoir claddings have the ability to store water. In some circumstances, water can migrate through these materials into the wall system.

To prevent moisture migration through reservoir claddings, the builder can either apply primer to the back side of the cladding or dissociate it from the wall system by providing an air space. With SIP wall systems, the latter approach of providing a drained and ventilated air space between the SIP and the wall cladding is recommended in areas where annual rainfall exceeds 20 inches. A vented air space allows any moisture that enters the SIP wall system – through bulk water, improperly sealed joints, window leakage or any other method—to dry without threatening the long-term durability of the structure.

### Back Ventilating

The method of constructing a vented air space (commonly referred to as “back ventilating”) depends on the type of cladding. For wood or fiber cement siding, this is best accomplished by installing the siding over furring strips to create a minimum ¼-inch air space between the siding and the weather-resistive barrier (Figure 1).

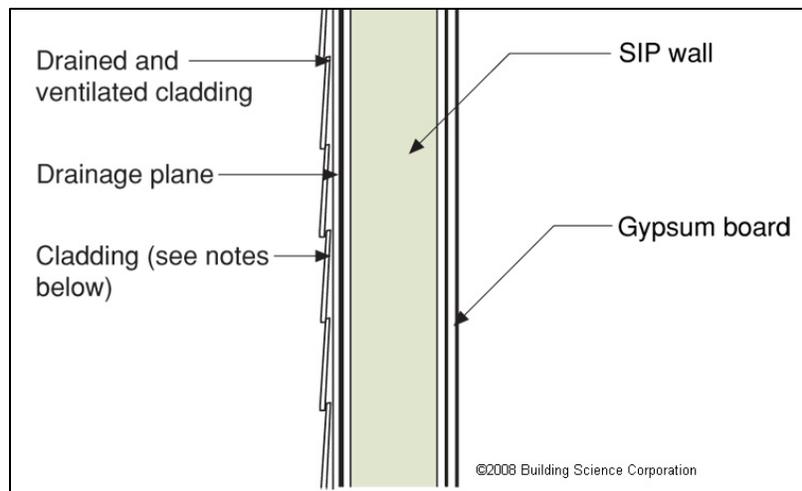


Figure 1: Wood and fiber cement siding

Cedar shingles, traditional stucco and manufactured stone veneers should be installed over drainage mats. Stucco systems require an additional layer of building paper between the drainage mat and the stucco to prevent the mat from becoming clogged with mortar or stucco (Figure 2).

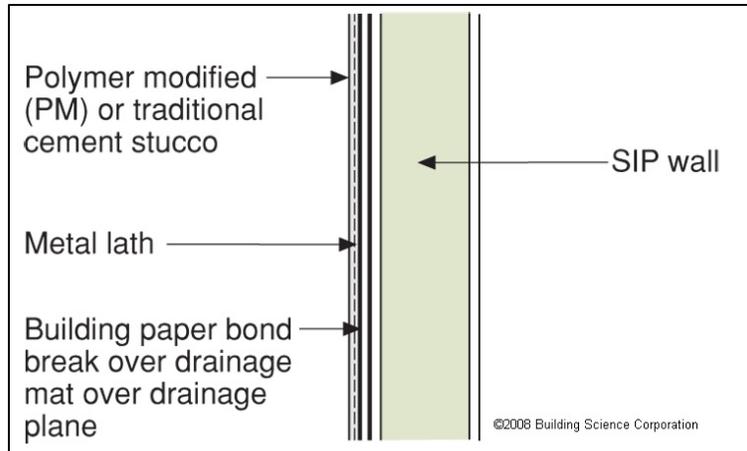


Figure 2: Stucco detailing

Vinyl and aluminum sidings are inherently back ventilated due to their profile and do not require furring strips or a drainage mat.

### Fastening Schedule

In the absence of dimensional lumber studs or other structural members, claddings are attached to the exterior facing of the SIP wall. The 7/16-inch OSB offers less pullout resistance and typically requires an increased fastening schedule for most cladding systems. Contact the manufacturer or distributor of the siding to determine the appropriate fastening schedule. If this information is not available, contact the SIP manufacturer.

## Windows and Doors

Windows and doors are common locations for moisture issues. As with all detailing on a SIP home, doors and windows need to be properly flashed to protect against bulk water. SIP homes are extremely airtight and any water that gets trapped inside the wall system carries the potential of causing serious moisture-related issues over time. Step-by-step instructions for proper window and door flashing can be found in the *Builder's Guide to Structural Insulated Panels (SIPs)*.

## Interior Finishes

### Pre-Applied Versus Site-Applied

Some SIP manufacturers offer SIPs with a pre-applied interior finish material, such as gypsum wall board or tongue and groove wood paneling. Pre-applied finishes can save time in situations where panels are placed over an exposed timber frame or other structural members. However, weather and other factors can severely damage pre-applied finishes during transport, unloading, staging, and installation. It is best to consider these factors before opting for pre-applied finishes.

Another option is to apply the interior finish material onsite before setting the panels. This limits the amount of time the finish materials will be exposed and potentially damaged. It is important to note that both pre-applied and site-applied finishes can interfere with the use of SIP tape if building in a cold or mixed climate where SIP tape should be applied on the interior.

The third option is to separate the SIPs from the exposed structural members using furring strips (Figure 3). This is a popular option for timber frames because it will accommodate timber shrinkage. If SIPs are fastened to a supporting timber through the pre-applied interior finish, movement or shrinkage of the timber can crack the interior finish material. This method also allows the interior finish material to be installed after the panels are set.

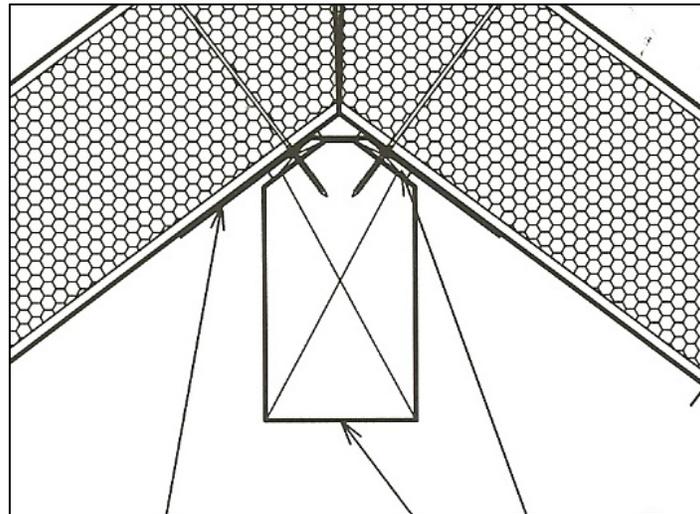


Figure 3: Furring strips beneath roof panels

## Exposed Beams and Rafters

Timber frame and traditional craftsman designs often call for exposed beams on the exterior or exposed rafter tails. If possible, extending rafters or beams through the SIP building enclosure should be avoided. These details not only create a thermal bridge to the outside, but as the lumber shrinks or moves over time they open a gateway for air leakage and moisture buildup.

False beams and rafter tails allow builders to achieve the same look without penetrating the building envelope. False rafter tails can even be embedded in the foam core of the SIP if they are specified in the design phase and approved by the engineer.



Figure 4: Embedded rafter tails

## Roofing

Any type of roofing commonly used in wood frame construction can be installed over a SIP roof system. Contact the roofing manufacturer for their specifications on how to attach the roofing to SIPs. Metal roofing may require an increased fastening schedule.

Vented roofing is recommended in climates where annual rainfall exceeds 20 inches. Vented roof systems are often referred to as a “cool roof” and should not be confused with a vented attic. The purpose of venting roofing over SIPs is to allow for any bulk water or water vapor that enters the SIP roof system to dry.

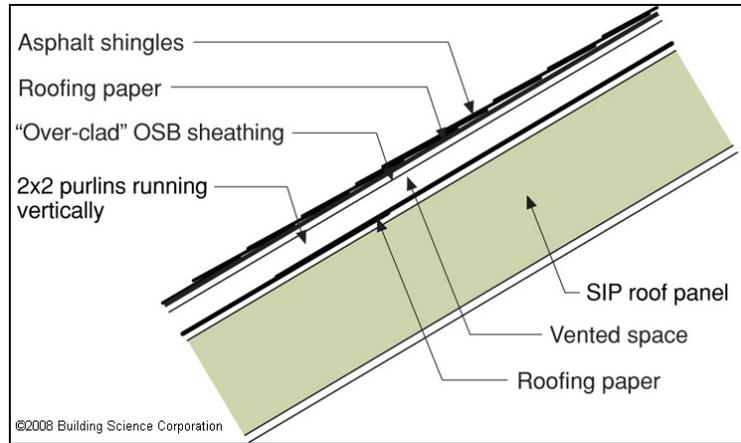


Figure 5: Vented roof with asphalt shingles

The method of constructing a vented roof depends on the type of roofing material used. Asphalt shingles need to be separated from the SIP facing with furring strips, followed by a second layer of roof sheathing and a second layer of roof underlayment (Figure 5). Cedar shingles or cedar shakes should be installed over a drainage mat. Metal roofing should be installed over diagonal furring strips (Figure 6).



Figure 6: Diagonal furring strips under metal roofing

### Asphalt Shingles

If building in a dry climate where roof venting is not required, it is important to note that some asphalt shingle manufacturers do not warranty their products over an unvented roof deck if the attic is not vented. Joseph Lstiburek notes in *Builder's Guide to Structural Insulated Panels (SIPs)* that venting or not venting the roof deck results in a minor increase in shingle temperature and a minor decrease in shingle life. However, the color of the shingles, the roof orientation and the building's geographic location all

have a much more significant impact on shingle life. He estimates that installing asphalt shingles over an unvented SIP roof deck will result in a reduction of shingle life between one and two years.

### **Shingle Ridging**

Another potential issue with asphalt shingles is shingle ridging. Shingle ridging is a common phenomenon in all types of wood frame construction where the expansion of roof sheathing due to heat and moisture causes shingles to buckle along joints. This is largely an aesthetic issue and has not been shown to have any effect on shingle life or functionality. Shingle ridging does not appear in wood shingles, wood shakes or standing seam metal roofs because these materials absorb any movement without visibly shifting along the panel joint.

Shingle ridging is not very widespread but often draws the attention of homeowners. The only way to prevent shingle ridging is to dissociate the asphalt shingles from the SIP by either constructing a vented roof (see Figure 5) or simply adding an additional layer of roof sheathing that overlaps the existing panel joints.

## **Summary**

Moisture protection is a major concern in any type of wood structure. SIPs are no different—they must be protected against bulk water by siding, roofing, and a weather-resistive barrier. However, SIP homes are more airtight, so any moisture that does make its way through the weather-resistive barrier is more likely to cause problems because there is no airflow to enable drying. For this reason, in wet climates it is recommended that builders back ventilate wall claddings and use a cool roof system.

An increased fastening schedule may also be required when attaching siding or metal roofing over SIPs. This can be obtained from most roofing or siding manufacturers. It is also important to minimize penetrations through the building envelope, seal penetrations where required, and properly flash windows and doors.