

CHAPTER 23

Siding

Section 23.1

Siding Basics

Section 23.2

Wood Bevel Siding

Section 23.3

Wood Shingle Siding

Section 23.4

Other Types of Siding

Chapter Objectives

After completing this chapter, you will be able to:

- **Identify** common siding materials.
- **Describe** how to prevent moisture from seeping into or behind siding.
- **Install** plain-bevel wood siding.
- **Describe** the four coursing styles for wood shingles.
- **Describe** vinyl, plywood, stucco, and fiber cement siding.
- **Explain** proper safety techniques when installing siding.

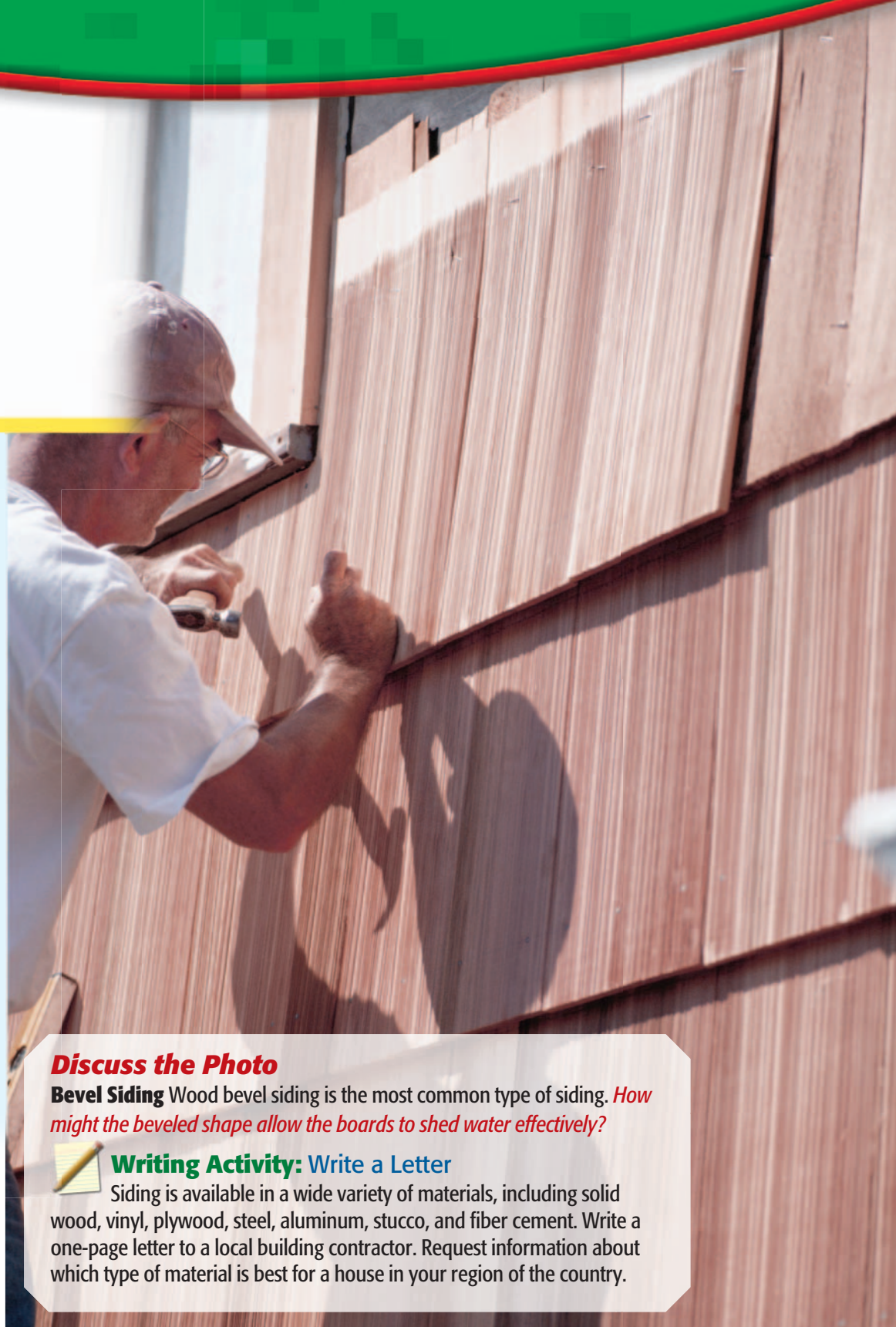
Discuss the Photo

Bevel Siding Wood bevel siding is the most common type of siding. *How might the beveled shape allow the boards to shed water effectively?*



Writing Activity: Write a Letter

Siding is available in a wide variety of materials, including solid wood, vinyl, plywood, steel, aluminum, stucco, and fiber cement. Write a one-page letter to a local building contractor. Request information about which type of material is best for a house in your region of the country.



Chapter 23 Reading Guide



Before You Read Preview

The siding of a house should be selected with great care. Siding has an effect on the overall appearance of a home, as well as on the proper ease of maintaining it. Look through the chapter, noting the photographs and reading their captions.

Content Vocabulary

- siding
- back-priming
- story pole
- undercourse
- J-channel
- drainage plane

Academic Vocabulary

You will find these words in your reading and on your tests. Use the academic vocabulary glossary to look up their definitions if necessary.

- traditional
- overall
- indicate

Graphic Organizer

As you read, use a chart like the one shown to describe problems and solutions associated with siding installation.

Problem	Solution
Moisture seeps into or behind the siding	Seal out water with proper detailing, flashing, and high-quality sealants



Go to glencoe.com for this book's OLC for a downloadable version of this graphic organizer.

Academic Standards



Mathematics

Number and Operation: Compute fluently and make reasonable estimates (NCTM)

Number and Operation: Understand numbers, ways of representing numbers, relationships among numbers, and number systems (NCTM)

Measurement: Apply appropriate techniques, tools, and formulas to determine measurements (NCTM)



English Language Arts

Use written language to communicate effectively (NCTE 4)

Use different writing process elements to communicate effectively (NCTE 5)

Develop an understanding of diversity in language use across cultures (NCTE 9)



Science

Life Science: The cell (NSES)

Science and Technology: Abilities of technological design (NSES)

Industry Standards

Exterior Finishing and Siding

NCTE National Council of Teachers of English

NCTM National Council of Teachers of Mathematics

NSES National Science Education Standards

Understanding Siding

Is siding waterproof?

Siding is the exterior wall covering of a house. Its purpose is to shed rain and protect the structural portions of walls. Depending on the material, siding is installed by either a carpenter or a siding specialty contractor. In either case, the process normally begins after windows and doors are in place and after the roofing has been installed.

Siding is available in a wide variety of materials, including solid wood, vinyl, plywood, steel, aluminum, stucco, and fiber cement. Many are available prefinished. This eliminates the need to paint or stain them after installation. Another siding material popular in some areas is brick, which is discussed in Chapter 24.

Wood Siding

The material most characteristic of North American houses is solid-wood siding, as shown in **Figure 23-1**. Many other siding



Figure 23-1 Wood Siding

Traditional Material Wood lap siding can be found in every region of the country.

materials, including fiber cement, engineered wood, and vinyl, are formed to look like wood siding.

Wood Quality Woods used for siding should have the ability to accept paint or stains, should be easy to work with, and should be dimensionally stable. These properties are present to a high degree in the cedars, eastern white pine, Western white pine, sugar pine, cypress, and redwood. They are present to a good degree in Western hemlock, ponderosa pine, spruce, and yellow poplar.


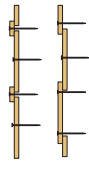






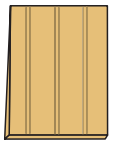
Exterior siding materials should be of a premium grade that is free from knots. The moisture content at the time of application should be the same that the wood will have during service. This is about 12 percent, except in the dry southwestern United States. There the moisture content should average about 9 percent.


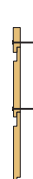






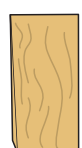
Types of Wood Siding

The following basic types of wood siding are shown in **Figure 23-2**, along with some less common types.

Builder's Tip

CODE TERMINOLOGY Building codes often use unfamiliar terminology. For example, the IRC refers to siding as “exterior wall covering.” These materials provide weather resistance to the “exterior wall envelope.” You will find it easier to locate information in the code book if you learn the code’s language. Whenever you find an unfamiliar word, check the Definitions section to determine its meaning.

Name	Board	Bevel	Bungalow	Dolly Varden	Panel
Version	Board and Batten  	Plain  	Plain  	Rabbeted Edge  	
Description	Available surfaced or rough textured.	Plain bevel may be used with smooth face exposed or sawn face exposed for textured effect.	Thicker and wider than bevel siding. Sometimes called <i>colonial</i> . Plain bungalow may be used with smooth face exposed for textured effect.	Thicker than bevel siding. Rabbeted edge.	Typically 4' x 8' or 4' x 9' in size. May include decorative grooves.
Application and Nailing	Recommended 1" minimum overlap. Use 10d siding nails as shown. Installed vertically or horizontally.	Recommended 1" minimum overlap on plain bevel siding. Use 6d siding nails as shown. Installed horizontally.	Same as for bevel siding, but use 8d siding nails. Installed horizontally.	Same as for rabbeted bevel, but use 8d siding nails. Installed horizontally.	Exterior-grade plywood sheets are applied vertically directly to studs. Horizontal joints are flashed. Vertical joints may be covered with wood battens.

Name	Channel Rustic	Drop	Log Cabin	Tongue & Groove	Wood Shingle
Version	Board and Gap  	Shiplap Patterns  	 	Plain  	
Description	Available in rough-sawn or smooth surface. Several thicknesses.	Available in various patterns.	1½" at thickest point.	Available in smooth surface or rough surface.	Available in random widths of 4" to 14". Lengths are 16", 18", and 24".
Application and Nailing	May be applied horizontally or vertically. Has ½" lap and 1¼" channel when installed. Use 8d siding nails as shown for 6" widths. Wider widths, nail twice per bearing. Installed horizontally or vertically.	Siding nails installed horizontally.	Nail 1½" up from lower edge of piece. Use 10d casing nails. Installed horizontally.	Use 6d finish nails as shown for 6" widths or less. Wider widths, face nail twice per bearing with 8d siding nails. Installed horizontally.	Applied in overlapping rows much like wood roof shingles.

 **Figure 23-2 Types of Wood Siding**

Many Shapes Wood siding comes in many forms, shapes, and sizes. *How is wood shingle siding installed?*

Vertical Solid wood boards with a uniform thickness are sometimes placed vertically over sheathing. The boards may be formed with a shiplap or tongue-and-groove edge to keep water out. When square-edge board siding is used, joints between boards must be covered with slender pieces of solid wood called *battens*. This is called *board-and-batten siding*.

Horizontal The most common type of solid wood siding is available as boards placed so that each piece overlaps the one below. A common type is plain-bevel siding, which is also called *clapboard siding*.

Panel Exterior-grade plywood panels may also be used for siding. The exposed surface is covered with a high-grade wood veneer that may have a smooth or rough-sawn surface and may have grooves cut into it. The edges of panels may be covered with battens or have a tongue-and-groove or shiplap joint to seal out water.

Shingle In some parts of the country, wood shingle siding is common. The individual shingles are nailed to the wall sheathing in much the same way as wood roof shingles are nailed to the roof sheathing.

Window Shutters

The installation of window shutters is sometimes coordinated with the installation of siding. Window shutters were first used

for protection from fierce weather and other hazards. Shutters are still used on today's homes, but in many parts of the United States are considered purely decorative. They are screwed to the siding or held with special clips. Installation may fall to various trades. The siding contractor installs vinyl shutters. Wood shutters might be installed by the carpenter or by the painting contractor after the house is painted.

In regions where storms and high winds are common, homes are increasingly being fitted with working shutters that can be closed to protect windows and sliding glass doors. These shutters are designed to withstand a moderate level of impact caused by wind-borne debris.



Reading Check

Summarize What is the main purpose of siding?

Preventing Moisture Problems

As noted earlier, siding is simply the first barrier to water. However, it is not the only barrier. Unless a secondary barrier is installed properly, moisture will be able to reach the wall sheathing and will eventually cause it to rot. The following construction methods help to seal out water:

Proper Detailing The siding must be installed so that water is directed away from joints. This is often done by lapping one piece of siding over another. Also, it is a code requirement that the lowest edge of any wood siding must be at least 8" above grade level. This helps to keep it dry and reduces the chance of insect infestation.

Flashing Metal flashing is used to seal the joints where the siding meets a horizontal surface. This includes the areas over door and window frames, as shown in **Figure 23-3**. Siding cannot dry out quickly where there is a tight fit. Flashing should extend well under the siding and sufficiently over edges and ends of a well-sloped drip cap to prevent water from seeping in.

Builder's Tip

WHERE TO CAULK The vertical joints between lengths of wood siding should be caulked with a durable, paintable sealant. Caulk is also needed around all corner boards and around other exterior trim elements. However, the horizontal joints between courses of beveled siding should never be caulked. Caulking prevents moisture vapor from escaping from behind the siding, which can cause rot.

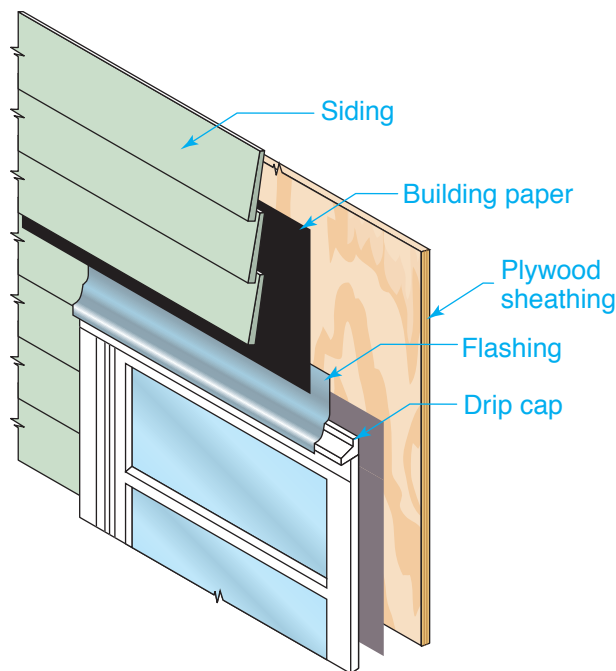


Figure 23-3 Flashing

Proper Overlaps Flashing should be used above windows and doors. The upper leg fits beneath the siding and building paper. Note how each material overlaps another.

High-Quality Sealants Exterior-grade sealants (a type of high-quality caulking) can be used to seal minor joints. Sealants should remain permanently flexible. Vinyl or fiber cement sidings may require a special sealant recommended by the siding manufacturer.

Protecting the Sheathing The sheathing of a house is entirely covered by the siding and trim. However, wind-blown rain or water vapor can still reach the sheathing. That is why the sheathing should be covered by a barrier of building paper or housewrap. The IRC refers to these materials as a weather-resistive barrier. They are stapled to the sheathing just before the siding is installed. Additional layers are placed under trim, such as around windows and doors. Every type of siding should be installed over building paper or housewrap.

It is very important to understand that these barriers are *water-resistant* but *not moisture-vapor resistant*. This means that they block moisture that is in the form of water,

but they do not block moisture that is in the form of vapor. Water that would reach these materials would come from outside the house. Vapor that would reach these materials would come from inside the house. These barriers are designed to prevent water from getting in without preventing vapor from getting out. The reason for this is simple. If vapor cannot escape, it will be trapped against the sheathing and will eventually cause serious problems.

Building Paper The **traditional** method for protecting sheathing is to cover it with horizontal courses of asphaltic felt, often called *building paper* or *building felt*. This is a heavy-duty asphalt-based paper product that comes in rolls 36" wide. Building paper comes in two weights: No. 15 (often referred to as 15 lb. paper) and No. 30 (30 lb. paper). The lighter paper (No. 15) is the minimum required by code beneath siding. Some manufacturers make a fiberglass-reinforced building paper that is less likely than standard paper to pucker if it gets wet.

Building paper should be applied smoothly to the sheathing using staples. Succeeding layers should lap at least 2" over strips previously applied. Where vertical joints are necessary, the building paper should be lapped at least 6". Particular care should be taken around window and door openings. Builders install extra strips of paper around the rough openings. Extra strips of paper about 6" wide should be installed behind all exterior trim.

Housewrap Housewraps are made from high-density polyethylene fibers. These fibers interlock to allow water vapor to pass through, but not water. A housewrap, shown in **Figure 23-4** on page 662, has some advantages over asphaltic felt. Because of its light weight, it comes in rolls 9' wide. This speeds installation and reduces the number of seams. A housewrap is difficult to rip, so it is less likely to be damaged during installation. Special adhesive tape called *housewrap seam tape* should be used to seal the seams. It should also be used to seal any punctures or tears in the housewrap.



Figure 23-4 Housewrap

Double Duty A housewrap is often applied to the sheathing before siding the house. It reduces air infiltration and protects the sheathing.

Housewrap should not be used beneath stucco sidings. The stucco can bond to the housewrap in a way that can cause it to lose effectiveness.

Siding Nails Nails used to install siding should be rust resistant and must not cause the siding to discolor or stain. Three types of nails with these characteristics are galvanized steel nails, stainless steel nails, and high-tensile-strength aluminum nails.

There are two kinds of galvanized nails: plated and hot-dipped. Mechanical plating provides a uniform coating, giving the nail predictable corrosion resistance. However,

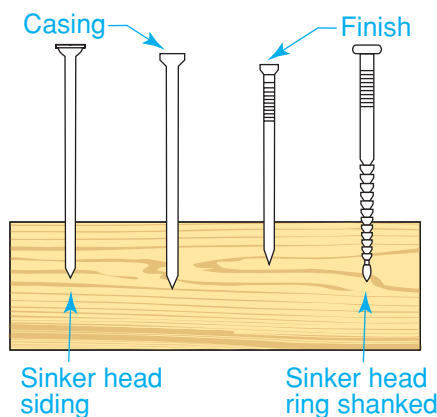


Figure 23-5 Siding Nails

Nail Types Nails commonly used for the application of siding.

hot-dipped nails are generally more corrosion resistant.

Stainless steel nails are recommended when maximum weather resistance is required, as in areas affected by salt spray. They are also a good choice for installing cedar siding because they are not affected by natural substances in the wood that can cause corrosion in other types of metals. Aluminum nails can be difficult to apply by hand. However, they are readily installed by pneumatic nailers.

The basic types of siding nails are shown in **Figure 23-5**. Nail heads are usually small so they will not show. Nail shanks may be smooth. However, ring-shank or spiral-threaded nails offer increased holding power.

Section 23.1 Assessment

After You Read: Self-Check

1. List three characteristics of wood that are important when it is used for siding.
2. Name the woods that have a high degree of the characteristics you noted for question 1.
3. What methods will help protect siding from moisture damage?
4. What is the primary purpose of building paper and housewrap?

Academic Integration: English Language Arts

5. **Wood Siding** The basic types of wood siding are vertical, horizontal, panel, and shingle. Create a brief description of each type of siding.

Go to glencoe.com for this book's OLC to check your answers.

Wood Bevel Siding

Preparation and Layout

What effects do various exposures have on siding?

Beveled siding is a very common type of horizontal wood siding. The beveled shape, shown in Figure 23-3 on page 661, allows the boards to be overlapped in horizontal courses that shed water effectively. There are several types of beveled siding. The most common is plain-bevel siding, sometimes called *clapboard siding* or *lap siding*. That is the type of siding that will be discussed in the following material. However, many of the installation details also apply to other types of beveled siding.

Sizes

Plain-bevel siding is made in nominal 4", 5", 6", 8", and 10" widths. The butt edge (the thickest part of the board) ranges from $\frac{7}{16}$ " to $\frac{1}{16}$ ", depending on the board's width. The top edge is $\frac{3}{16}$ " thick in all sizes. Plain-bevel siding generally comes in random lengths from 4' to 16'. One face of each board is rough-sawn, while the other face is smooth. The siding can be installed with either surface exposed.

Preparing the Wood

Before installing plain-bevel siding, allow it to reach a moisture content compatible with local conditions. This will prevent excessive shrinkage after the siding is in place.

Wood siding that will be painted should be primed before it is installed. This ensures that all surfaces are protected and improves the durability of the siding as well as the final finish. If the siding has not been primed on all surfaces by the manufacturer (this is called *pre-priming*), the back surface of the boards should be primed on site, which is called **back-priming**. The front surface can then be primed after installation.

Another protective option is to treat the boards with a water repellent before installation. This may be done by brushing or spraying the water repellent on all surfaces. The ends of boards cut during installation should also receive treatment with water repellent.



Reading Check

Recall What is the purpose of the beveled shape of beveled siding?

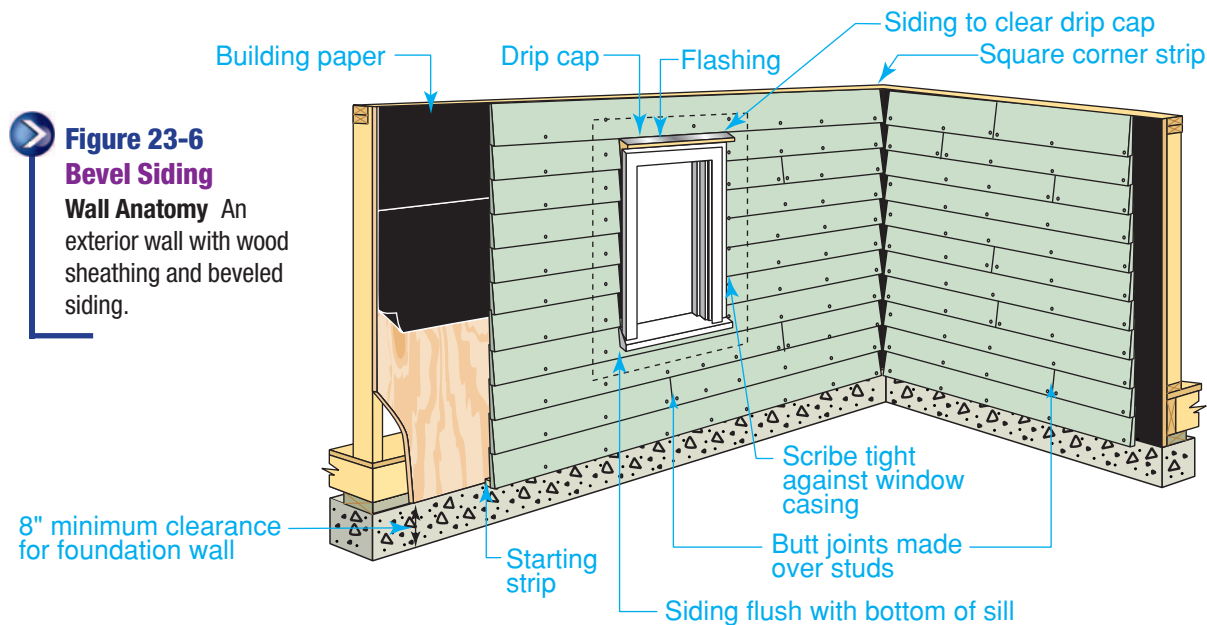
Determining Exposure

The first row of bevel siding is installed at the bottom of a wall and installation progresses upward from there. Each new course overlaps the top edge of the previous course, as shown in Figure 23-6 on page 664.

The spacing for plain-bevel siding should be carefully laid out in advance. This ensures an even appearance. It also helps to avoid awkward details, such as having to make a deep notch in a siding board to make it fit over a window or door. Layout starts by determining the number of courses required to cover a wall.

Determine the number of courses by measuring from the underside of the soffit to a point 1" below the sheathing, as shown in Figure 23-7 on page 664. Divide that distance by the maximum exposure of a single piece of siding. The *exposure* is the amount of surface exposed to the weather. To determine the exposure, deduct the minimum overlap (head lap) from the total width of the siding. The minimum overlap is 1" for 4" and 6" widths and $1\frac{1}{4}$ " for widths over 6".

For example, if nominal 10" plain-bevel siding is used, its actual width is $9\frac{1}{4}$ ". A minimum overlap of $1\frac{1}{4}$ " is required. Therefore, the maximum exposure is 8" ($9\frac{1}{4}" - 1\frac{1}{4}" = 8"$).



With a pair of dividers set at 8", make a trial layout on the wall. Begin at the bottom and "walk off" the height of the wall in 8" increments. The bottom of the piece of siding that passes over the top of the first-floor windows should meet with the top of the window (see Figure 23-6). If it does not line up properly, adjust the exposure distance until it does. Note that in this case, 8" is the maximum exposure. Any adjustments must be to something less than 8". Another way to make the layout work is to raise or lower the first piece of siding slightly.

It is good practice to have a consistent exposure on each course of siding. However,

it is also good practice to avoid having to notch siding to fit around the top and bottom of windows and doors. Sometimes it is not possible to follow both practices. Many carpenters think it is most important to avoid notching. In order to avoid this, they make slight corrections in the spacing of several courses. If the adjustments are small, they will not be noticeable. The appearance of a notch in siding is generally more noticeable.

Making a Story Pole Many carpenters rely on a story pole when installing siding. A **story pole** is a measuring device made on site to ensure a uniform layout all around the house. A story pole is shown in Figure 23-8.

The story pole should reach from the underside of the soffit beyond the bottom edge of the first piece of siding as shown from A to B. Hold the story pole in position against the building. Lay out the spacing on the story pole as shown at C. Check to be certain that the bottom edge of the siding over the window is even with the top of the window as shown at D.

To make a story pole, select a straight piece of 1×2 stock approximately 8' to 10' long. Determine the number of courses and the spacing as described above. Lay out the spacing on the story pole. Additional information,

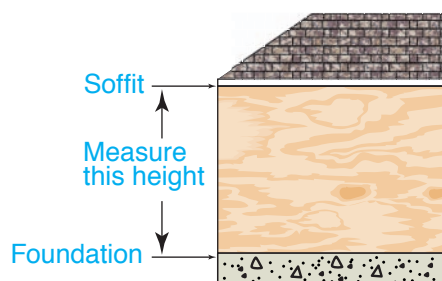


Figure 23-7 Determining the Number of Courses

Measure the Wall Measure the vertical distance to be covered by the siding to determine how many courses will fit.

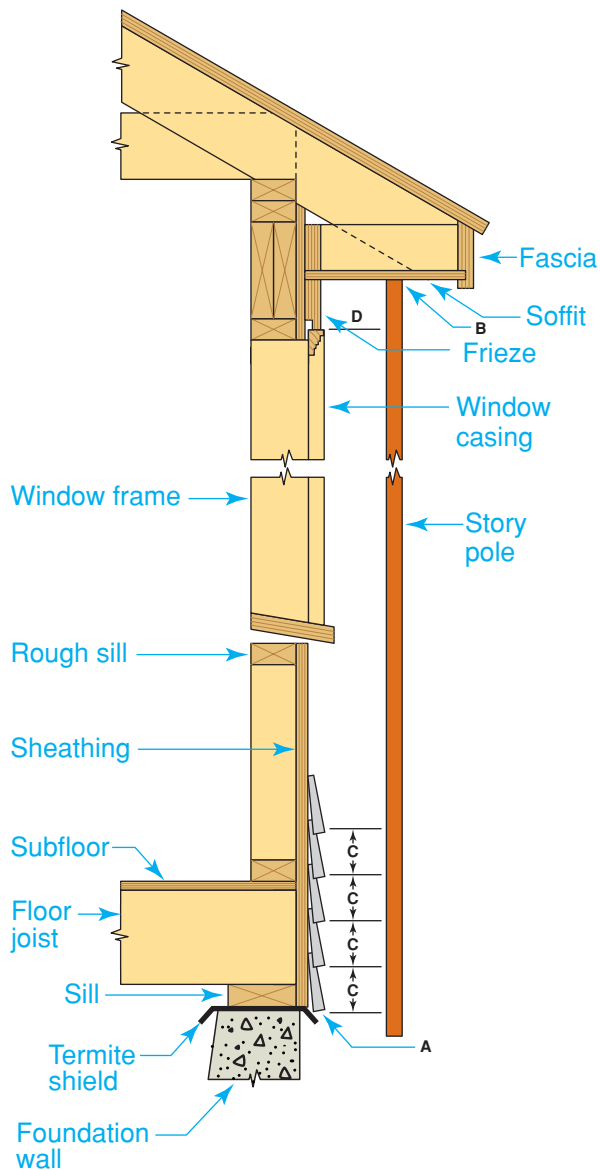


Figure 23-8 Using a Story Pole
Siding Aid The story pole should reach from the underside of the soffit to a point beyond the bottom edge of the siding.

such as the height of windowsills, can also be marked on the story pole. The story pole can now be used on each wall of the house to ensure consistent spacing of the siding.

Application

Why is $\frac{5}{4}$ stock used for corner boards?

Siding can be installed after the house has been wrapped with building paper or house-wrap. How well the first course of siding is

applied determines how level and uniform the succeeding courses will be.

First, install all trim around windows and doors. Install *corner strips* at inside corners and *corner boards* at outside corners. These are lengths of solid wood trim that are placed vertically over the sheathing where walls intersect, as shown in **Figure 23-9**. They protect the corner joint from water seepage. The size of this trim may be specified on the building plans. It varies according to the style of the house and the thickness of the siding. However, corner boards are generally made of $1\frac{1}{4}$ " thick stock. This stock is sometimes called $\frac{5}{4}$ (*five quarter*) stock. Insider corner strips are approximately $1\frac{1}{8}$ " \times $1\frac{1}{8}$ " in size, depending upon the thickness of the siding.

Assembling Corner Boards Outside corner boards are nailed together before being nailed to the house. This ensures a tight joint and is much easier than nailing each board to the house separately.

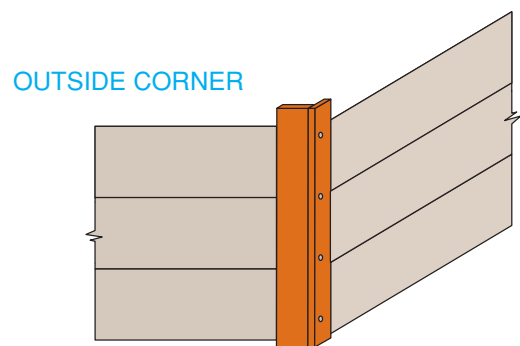
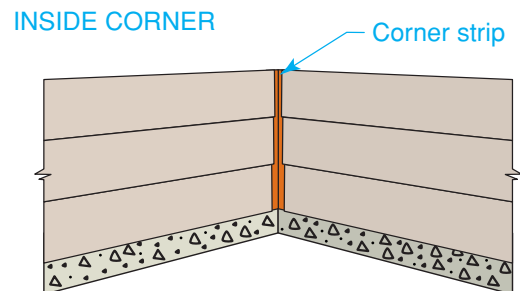


Figure 23-9 Corner Boards
End Cap The ends of bevel siding fit against corner strips or corner boards.

Step-by-Step Application

Installing Plain-Bevel Siding Before you begin, cut a piece of stock to serve as a story pole.

Step 1 Hold the story pole in position against the soffit. Transfer the marks from the story pole to the house on all corners and on all window and door casings. On a long wall, intermediate layout marks may also be needed. Make sure that the bottom marks are clearly visible on the foundation (see **Figure 23-10**).

Step 2 Snap a chalk line between the lowest marks around the perimeter of the house. Nail a furring strip (sometimes called a *starting strip*) about $\frac{3}{8}$ " above this line to provide support for the first course. The strip can be a board ripped at an angle or an extra siding board (see **Figure 23-11**).

Step 3 Start the first course at one end of the wall and work toward the other end. Attach the first board to the bottom plate by placing nails just below each stud. This marks the nailing locations for the succeeding courses. Use 6d siding nails for standard beveled siding. Use 8d siding nails for thicker siding (see **Figure 23-12**).

Step 4 On long walls, two or more lengths of siding may be required for each course. Cut the ends of adjoining boards square to create a tight-fitting butt joint. Joints should be staggered so that they do not line up with joints in the adjacent three or four courses (see Figure 23-6 on page 664). Some carpenters prefer to use a scarf joint for extra weather tightness, but this is more time consuming. A *scarf joint* is formed by cutting an angle on the ends of boards so that they overlap.

Step 5 Continue to install additional courses by aligning the siding with your layout marks. To prevent splitting and to allow expansion clearance, it is generally best not to nail through the course underneath. However this is difficult to avoid with some exposures. Nails should be perpendicular to the face of the siding. Tap the nail head flush with the surface. Note that the nails do not pierce the siding in the course below (see **Figure 23-13**).

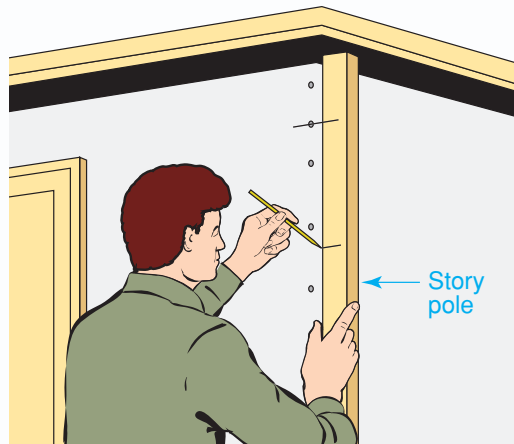


Figure 23-10 Story Pole

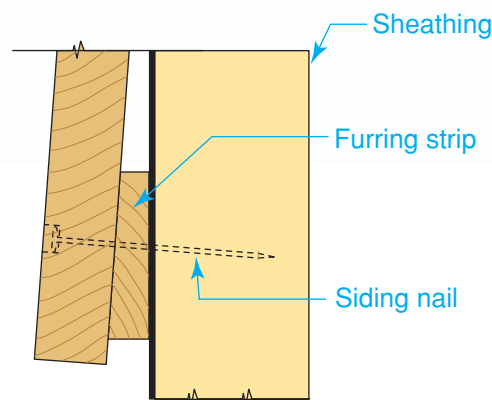


Figure 23-11 Starter Strip

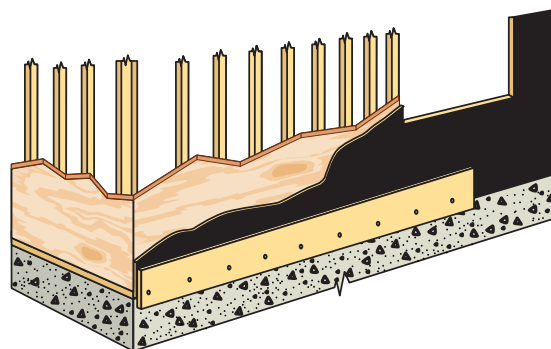
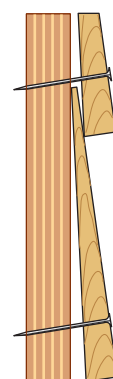


Figure 23-12 Nailing the First Course

Step 6 Where siding must be cut to fit against trim, hold a piece of siding in place. Use a small wood block gauge to accurately mark pieces that must fit against a vertical surface. The siding gauge can be made from a scrap of plywood, as in **Figure 23-14A**. To use it, cut a siding board slightly long and hold it in position against the house. Hold the siding gauge over the board and against the side of the window casing, as shown in **Figure 23-14B**. Mark the siding board to length.

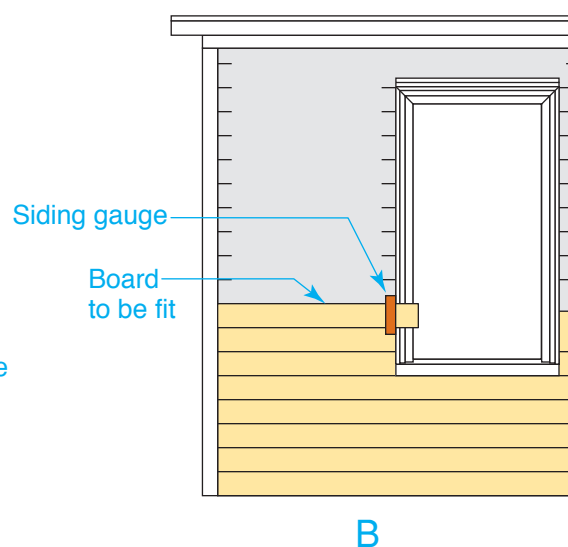
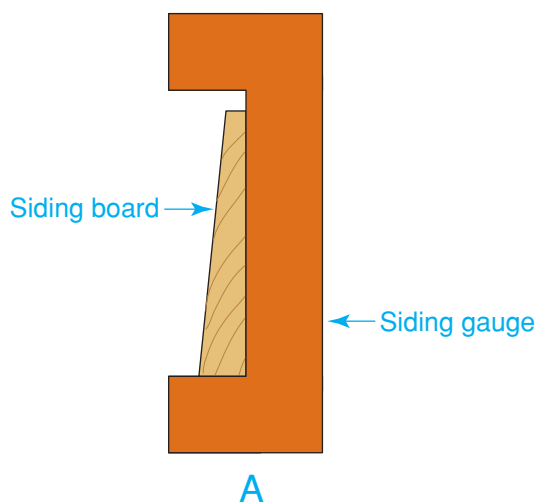
Step 7 Siding that passes under a windowsill should be cut to fit into the groove in the bottom of the sill. Siding installed over doors and windows should stop slightly above the window flashing to encourage drainage.

Step 8 Where siding meets a roof, as on a dormer, allow a 2" clearance between the cut ends of the siding and the flashing. This ensures proper drainage. It also protects the vulnerable end grain of the siding from prolonged contact with water. See pages 667–668 for an explanation.



 **Figure 23-13 Nail Location**

Step 9 Trim the last course of siding to fit under the eaves. Apply any molding or trim called for in the plans. After the face of the siding has been primed, but before it has been painted, caulk vertical joints between lengths of trim.



 **Figure 23-14 Using a Siding Gauge**

 Go to glencoe.com for this book's OLC for additional step-by-step procedures, applications, and certification practice.

Alternative Corner Treatment

At the outside corners of a house, plain-bevel siding is generally fitted snugly against the corner boards. However, the ends of the boards can be mitered instead, as shown in **Figure 23-15**. Mitered corners,

sometimes used with thicker siding, should be cut with a compound-miter saw. They must fit tightly and smoothly for the full depth of the miter. Nail mitered ends to the sheathing, not to each other.



Estimating and Planning



This estimating and planning exercise will prepare you for national competitive events with organizations such as SkillsUSA and the Home Builder's Institute.

Beveled Siding Materials

Estimating Siding

To estimate the amount of siding needed, you must determine the area to be covered.

Step 1 Find the area by multiplying the perimeter of the house by the wall height. For a house with a gable roof, figure the gable-end area separately and add the result to the side wall area. Subtract any areas greater than 50 sq. ft. that will not be sided, such as garage doors. You do not need to subtract smaller areas, such as windows and doors. For example, consider a house 46' long and 26' wide with a hip roof. Its perimeter is 144' ($46 + 46 + 26 + 26 = 144$). With 8' high walls, the total area to be covered is 1,152 sq. ft. ($144 \times 8 = 1,152$). If the garage door openings total 112 sq. ft., the total area to be sided is 1,040 sq. ft. ($1,152 - 112 = 1,040$).

Step 2 Multiply the square footage of walls by the appropriate area factor from **Table 23-1**. This table includes factors for calculating different dimensions of beveled siding. The factors are based on actual exposures,

including an allowance for trimming and waste. For example, if nominal 1×10 beveled siding is to be used, 1,238.4 sq. ft. would be required ($1,040 \times 1.21 = 1,238.4$).

Step 3 Round up the answer to the nearest hundred. In the example, that would be 1,300 sq. ft. Any siding left over after the project is complete should be left for the homeowner to use for future repairs.

Step 4 To determine the number of nails needed, refer to **Table 23-2**. For example, 1×10 siding requires $\frac{1}{2}$ (0.5) lb. of nails per 100 sq. ft. In our example, about 1,300 sq. ft. of siding will be installed. Divide this by 100 ($1,300 \div 100 = 13$). Then multiply the resulting figure by the weight of nails required per 100 sq. ft. ($13 \times 0.5 = 6.5$ lbs. of nails).

Estimating on the Job

A house is 58' long and 27' wide and has a hip roof. The walls are 8' high. How many square feet of 1×8 siding will be required and how many pounds of nails would be needed?

Table 23-1: Coverage Estimator for Beveled Siding

Nominal Size	Width		Area Factor
	Dress	Face	
1×4	3½	3½	1.60
1×6	5½	5½	1.33
1×8	7¼	7¼	1.28
1×10	9¼	9¼	1.21
1×12	11¼	11¼	1.17

Table 23-2: Nails Required for Beveled Siding

Size	Nails (per 100 sq. ft.)
1×4	1½ pounds
1×5	1½ pounds
1×6	1 pound
1×8	¾ pound
1×10	½ pound
1×12	½ pound

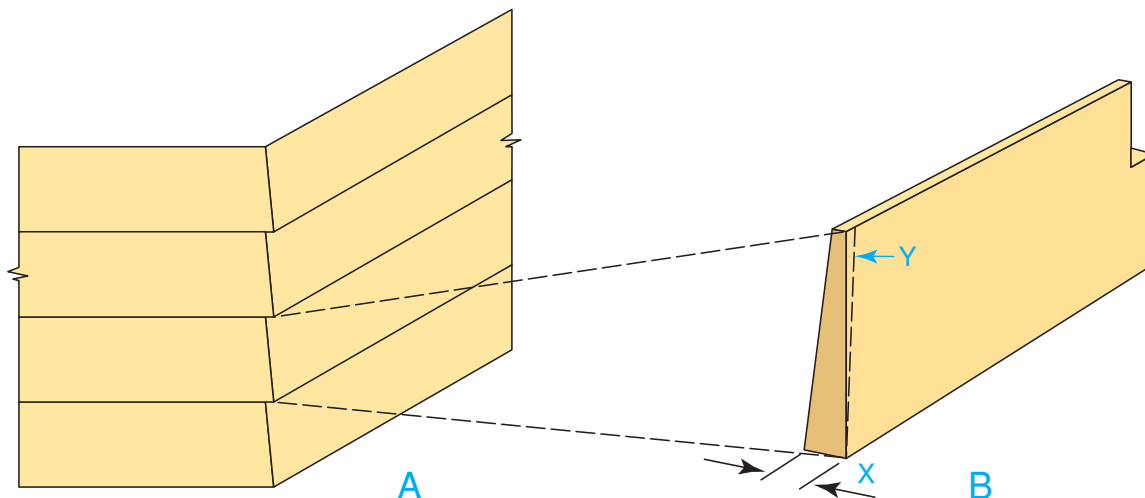


Figure 23-15 Mitered Corners
Outside Corners Mitering plain-bevel siding.

Mitering siding at outside corners calls for careful workmanship to make a weather-resistant joint, as shown in Figure 23-15A. To lay out and cut the joint, measure the butt edge thickness (X) as shown in Figure 23-15B.

Measure back along the top edge a distance equal to the butt edge thickness. Then connect these two points as shown by the dashed lines (Y). With the saw blade set at about a 47° angle, make the cut beginning at the butt end.

Section 23.2 Assessment

After You Read: Self-Check

1. What is back-priming and why is it important?
2. What other finishing method can be used to improve the durability of siding?
3. What is the best way to ensure consistent spacing of siding?
4. Explain the use of a small wood gauge when cutting siding.

Academic Integration: Mathematics

5. **Mental Math** Suppose that the distance from the top of the foundation to the top of the window in a garage is 6'-6". Beveled siding of 8" nominal width is to be applied. Beveled siding of 8" nominal width has an actual width of $7\frac{1}{4}$ ". The minimum overlap recommended for this siding is $1\frac{1}{4}$ ". How could you use mental math to determine how many courses are required to reach the top of the window?

Math Concept To use mental math to solve a measurement problem, visualize the situation and look for convenient numbers to work with.

Step 1: First think through how to find the width of exposure for each course.

Step 2: Divide the total distance to the top of the window by the exposure width.

Step 3: If the number of courses comes just to the top of the window, you have solved the problem. Otherwise, rethink how the courses should be overlapped.

Go to glencoe.com for this book's OLC to check your answers.

Wood Shingle Siding

Wood Shingle Siding

How are wall shingles similar to roof shingles?

When wood shingles are used as siding they are sometimes referred to as *side-wall shingles*. They are most commonly made from red cedar, but white cedar and other woods are also used.

Wood shingles are generally installed one by one. However, some companies manufacture a product that combines groups of shingles. The shingles are attached at the factory to a plywood backing. The resulting shingle panel is then nailed into place.

Grades and Sizes

Sidewall shingles are usually classified into four grades. The first grade includes clear, all-heartwood shingles. The second grade consists of shingles with a clear exposed area (butt) and allows defects in the part that will be covered in use. The third grade includes shingles that have defects other than those permitted in the second grade. The fourth is a utility grade used for undercourses on double-coursed side walls. An **undercourse** is a low-grade layer of shingles that will not be exposed to the weather.

Shingles come in lengths of 16", 18", and 24". They are packaged in bundles but the coverage of a single bundle will vary depending on how the shingles are installed. Shingles may be prefinished or finished after installation. They are made in random widths. In the first grade, they vary from 3" to 14" wide, with only a small proportion of the narrowest width permitted in each bundle. Shingles cut to uniform widths of 4", 5", or 6" are also available. They are known as *dimension shingles* or *rebutted-and-rejointed shingles*. Their edges are machine trimmed so as to be exactly parallel; exposed ends are

trimmed at 90° angles. Dimension shingles are applied with tight-fitting joints to create an unbroken horizontal line.



Reading Check

State What types of wood are most commonly used for wood shingle siding?

Application

Shingles are generally spaced $\frac{1}{8}$ " to $\frac{1}{4}$ " apart. This allows them to expand and prevents buckling. Maximum exposures vary. Spacing for the shingle courses is determined in the same way as for plain-bevel siding.

There are several methods for installing siding shingles, as shown in **Figure 23-16**. The method selected determines the **overall** look of the house.

Single Coursing In single coursing, each course of shingles overlaps the one below so that every part of the wall is covered with two layers. The same grade of shingle must be used throughout. Weather exposure is fairly small (Figure 23-16A).

Double Coursing One purpose of this method is to obtain deep shadow lines for appearance. High-grade shingles are laid over undercourse-grade shingles. This method is less expensive than single-coursing because fewer high-grade shingles are used. Rebutted-and-rejointed shingles are sometimes used as the outer course for length (Figure 23-16B).

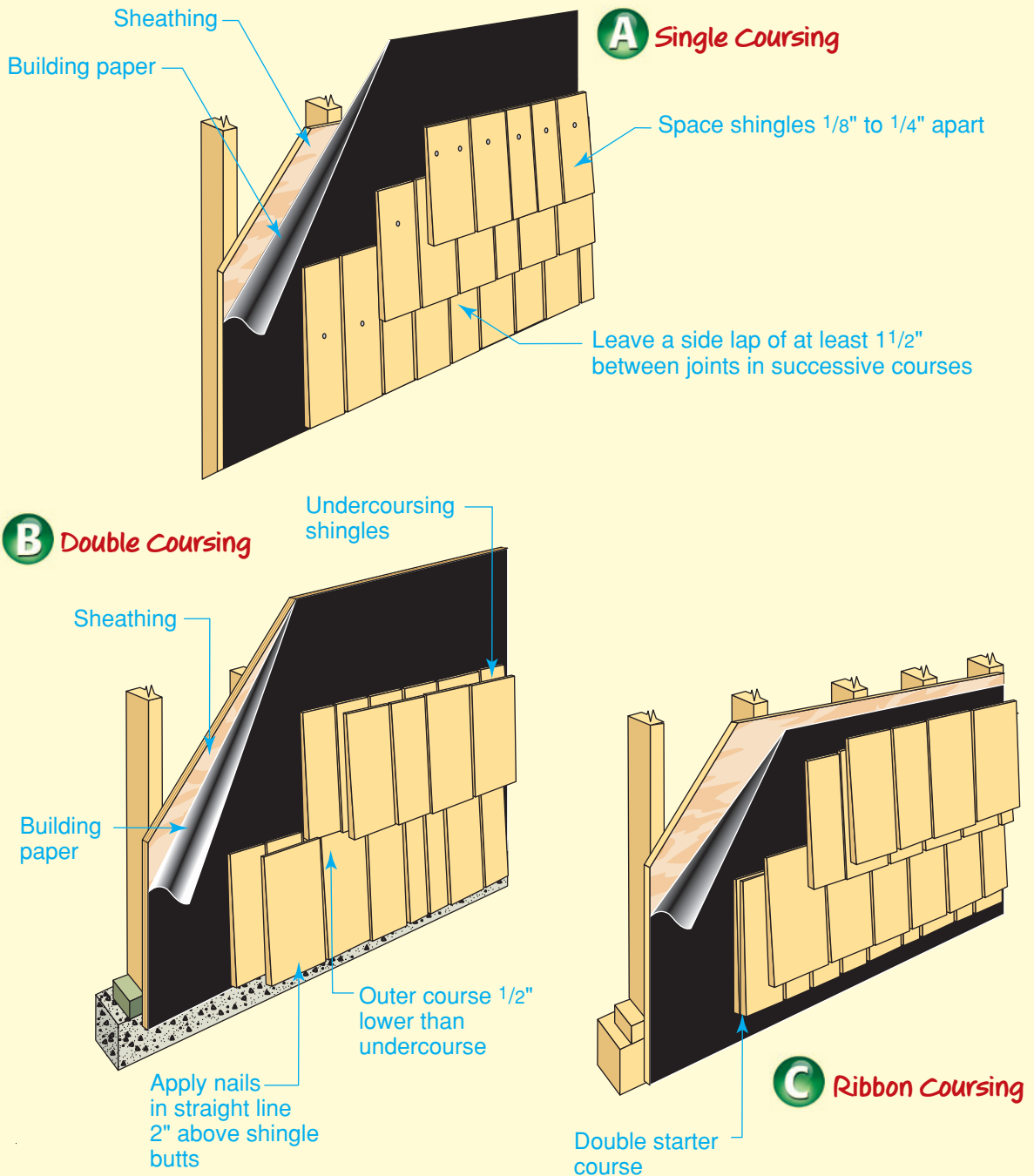
Ribbon Coursing In this method, a double shadow line is created by raising the outer course slightly above the undercourse. Because the undercourse is partially exposed, however, it should be the same grade of shingle as the outer course (Figure 23-16C).

Decorative Coursing A rustic effect can be created if the exposed end of every other shingle is placed at a slightly different

distance from a horizontal layout line. This results in an edge line that appears staggered.

 **Figure 23-16 Types of Shingle Coursing**

Three Methods Each different method for installing shingles results in a different overall appearance:
A. Single coursing **B.** Double coursing **C.** Ribbon coursing.



Nailing

For double coursing, secure each outer-course shingle with two small-head, rust-resistant, 5d nails driven about 2" above the butt edges and $\frac{3}{4}$ " in from each side, as shown in **Figure 23-17**. Drive additional nails about 4" apart across the face of the shingle. Single coursing involves the same number of nails, but they can be shorter, such as 3d. Blind nail them not more than 1" above the butt edge of the next higher course. Never drive the nail so tight that its head crushes the wood.

Outside corners can be interlaced, mitered, or butted into corner boards as shown in **Figure 23-17**. Laced ends overlap in an alternating pattern. Inside corners may be mitered over metal flashing or butted to a corner strip similar to that used when installing plain-bevel siding.

Estimating

To determine the number of shingles needed, figure the area to be covered plus a trim and waste allowance. For single coursing, one *square* (4 bundles) of 16" shingles with a $7\frac{1}{2}$ " exposure will cover 150 sq. ft. as shown in **Table 23-3**.

For example, suppose a house requires 902 sq. ft. of siding. Add 5 percent to this number for trim and waste. Then divide by 150 (the area covered by 1 square of shingles):

$$902 \times 0.05 = 45.1$$

$$902 + 45.1 = 947.1 \text{ sq. ft. to be covered}$$

$$947.1 \div 150 = 6.31, \text{ or } 6\frac{1}{2} \text{ squares}$$

Since there are 4 bundles in a square, 26 bundles will be required to shingle the house in this example ($4 \times 6.5 = 26$).

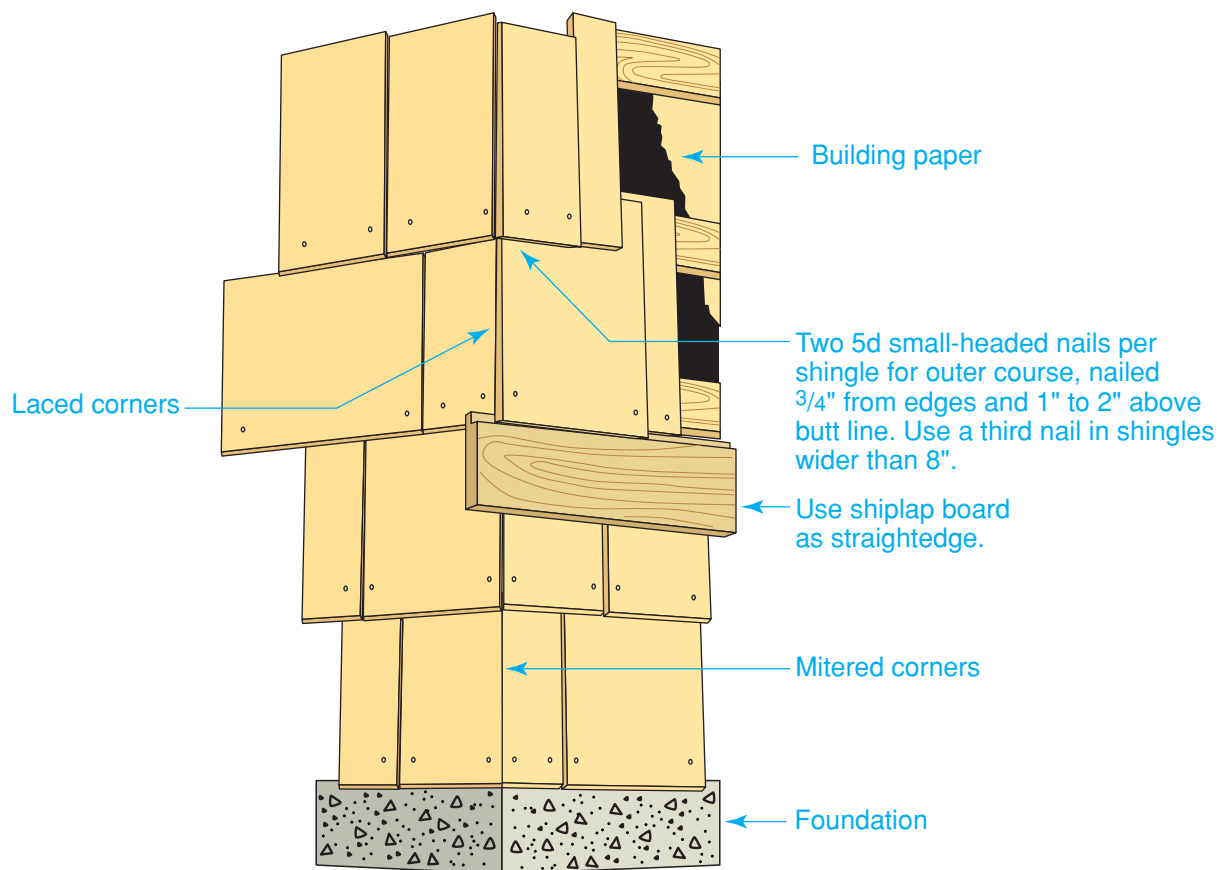


Figure 23-17 Installation Details

Nails and Alignment One method of finishing outside corners. Shingles may also be butted into vertical corner boards. A board can be used to keep the rows of shingles straight.

Table 23-3: Sidewall Shingle Exposure and Coverage

Length and Thickness (inches)	Approximate coverage in square feet of one square (4 bundles) of shingles based on the following exposures												
	3½"	4"	4½"	5"	5½"	6"	6½"	7"	7½"	8"	8½"	9"	9½"
16×5/2	70	80	90	100 ^(a)	110	120	130	140	150 ^(b)	160	170	180	190
18×5/2¼	—	72½	81½	90½	100 ^(a)	109	118	127	136	145½	154½ ^(b)	163½	172½
24×4/2	—	—	—	—	—	80	86½	93	100 ^(a)	106½	113	120	126½
	10"	10½"	11"	11½"	12"	12½"	13"	13½"	14"	14½"	15"	15½"	16"
16×5/2	200	210	220	230	240 ^(c)	—	—	—	—	—	—	—	—
18×5/2¼	181½	191	200	209	218	227	236	245½	234½	—	—	—	—
24×4/2	133	140	146½	153 ^(b)	160	166½	173	180	186½	193	200	206½	213 ^(c)

Note: The thickness dimension represents the total thickness of a number of shingles. For example, 5/2" means that 5 shingles, measured across the thickest portion, when green, measure 2 full inches.

^(a)Maximum exposure recommended for roofs.

^(b)Maximum exposure recommended for single coursing on side walls.

^(c)Maximum exposure recommended for double coursing on side walls.

Section 23.3 Assessment

After You Read: Self-Check

1. Describe the top two grades of siding shingles.
2. What is an undercourse?
3. With ribbon coursing, why should the undercourse be the same grade of shingle as the outer course?
4. For single coursing, how many square feet will 1 square of 16" shingles with a 7½" exposure cover?

Academic Integration: Mathematics


5. **Estimating Siding** Suppose a house requires 860 sq. ft. of siding. How many bundles of 16" shingles with a 6" exposure will be needed to shingle the house if you add 5% for trim and waste?

Math Concept To add 5% to a number, you can use a calculator to multiply that number by 105%.

Step 1: Find the total number of square feet of siding you will need including trim and waste.

Step 2: Use the table to determine the approximate coverage of one square of shingles given the size and exposure of the shingles you are using.

Step 3: Multiply by 4, the number of bundles in a square.

 Go to glencoe.com for this book's OLC to check your answers.

Other Types of Siding

Vinyl Siding

What is a buttlock?

Vinyl siding is a manufactured product made primarily of polyvinyl chloride (PVC). It is colored throughout the thickness of the material, not just on the surface. This means that scratches are not noticeable. Vinyl siding can be installed more quickly than wood siding. If damaged, it can be easily removed and replaced. It will not rot and requires little maintenance. Various textures, colors, and grades of siding are available. The thickness of the vinyl itself ranges from 0.035" to 0.055".

Vinyl siding is applied in horizontal pieces, called *panels*, that consist of one or more courses, as shown in **Figure 23-18**. The panels are shaped to resemble wood lap siding. Vinyl siding should always be installed over a weather-resistive barrier such as housewrap. Though vinyl itself is waterproof, the joints of a siding installation are not. Under some circumstances, wind can drive water through the joints. This is why a weather-resistive barrier is required. The joints between panels allow moisture vapor to escape.

A slotted *nailing flange* (also called a *nail hem*) at the top of each panel is used when nailing the panel to sheathing, as shown in **Figure 23-19**. The bottom edge, called the *buttlock*, fits into the top lock in the panel below. The specific characteristics and durability of manufactured siding materials vary from manufacturer to manufacturer. Always follow the manufacturer's instructions for the product you are installing. This will ensure that the product warranty will cover the completed project.

Wood trim and corner pieces are not used when installing vinyl siding. Instead, various accessory parts are used to serve the same purpose.

Accessories include starter strips, corner posts, and window trim such as those shown in **Figure 23-20**. Accessories must be ordered at the same time and from the same manufacturer as the siding. This ensures that the color will match.

Application

Vinyl siding is typically installed by contractors who specialize in one or more vinyl product lines. They sometimes



Figure 23-18 Vinyl Siding

Interlocking Joints The lower edge of a vinyl siding panel hooks onto the flange of a panel already installed.

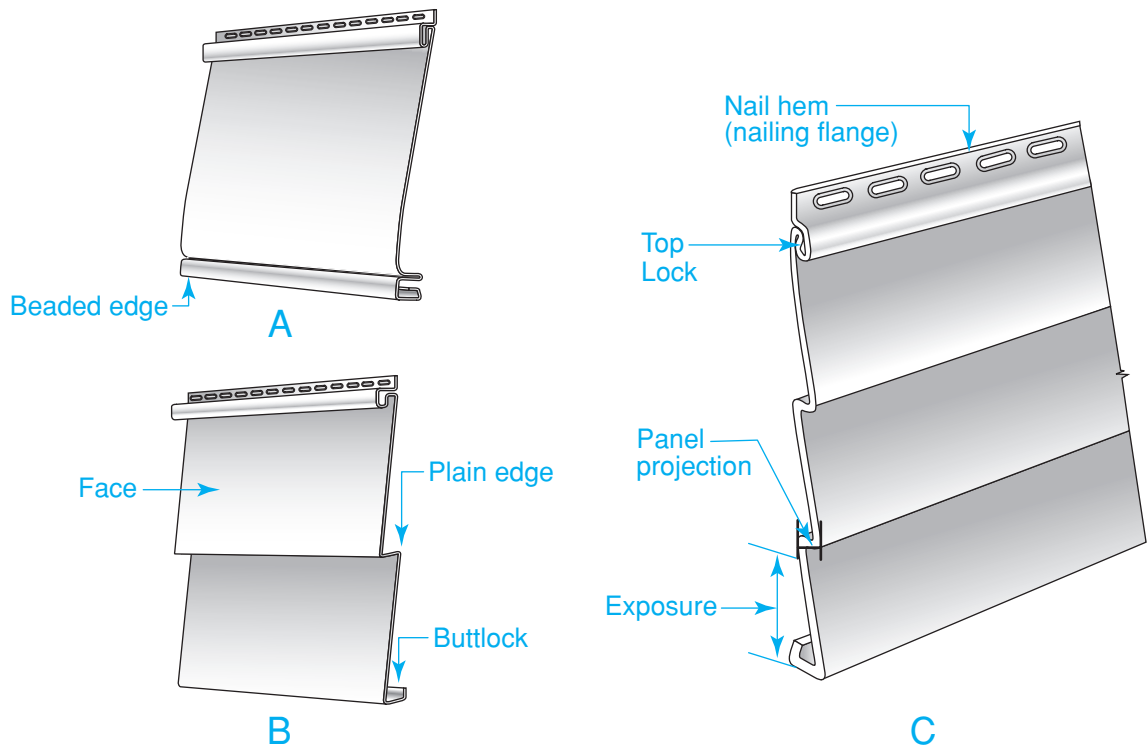


Figure 23-19 Vinyl Siding Panels

Panel Anatomy Types of vinyl siding panels. **A.** Single lap. **B.** Double lap. **C.** Triple lap. The terminology used here applies to any vinyl siding panel.

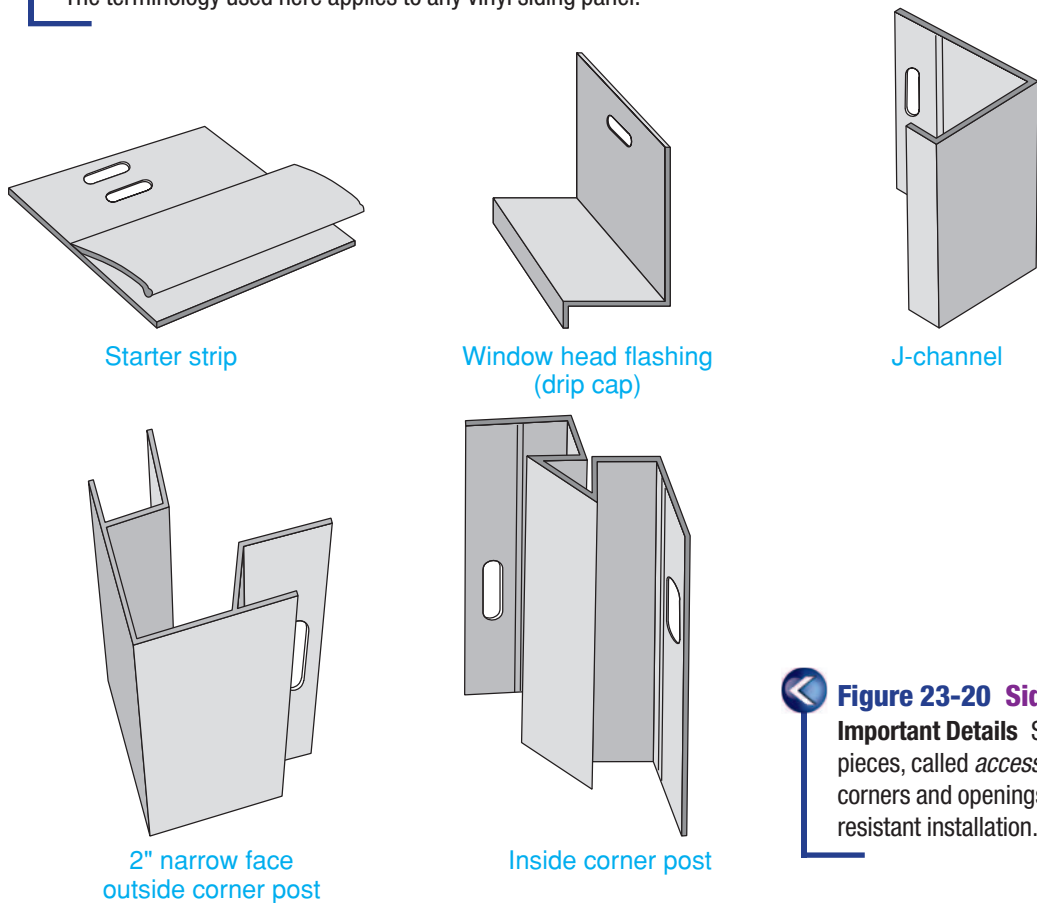


Figure 23-20 Siding Accessories
Important Details Specially shaped pieces, called *accessories*, must be used at corners and openings to ensure a weather-resistant installation.

undergo training programs sponsored by vinyl siding manufacturers. The IRC does not specify a particular installation method for vinyl siding. Instead, it simply says that vinyl siding must be installed according to the manufacturer's installation instructions. However, the methods described in the following pages are generally accepted.



Recall Why is it important to include an additional weather-resistive barrier?

Fastening Techniques Vinyl siding expands and contracts much more than wood. For this reason, using the correct fastening technique is extremely important. Vinyl siding is generally nailed through the sheathing and into studs using corrosion-resistant nails. Staples and pan-head screws may also be permitted, but check the manufacturer's installation literature for details. Nails should have heads at least $\frac{5}{16}$ " in diameter, with a $\frac{1}{8}$ " shank. They should be long enough to penetrate at least $\frac{3}{4}$ " into the framing.

Good nailing technique includes the following:

- Never drive nails tight, unless manufacturer's instructions specifically recommend otherwise. Leave approximately $\frac{1}{32}$ " (the thickness of a dime) between the underside of the head and the vinyl. This allows the vinyl to expand and contract and prevents it from buckling with changes in temperature.
- Always drive fasteners straight and level. This prevents the panel from distorting. Start in the center of the panel and work toward the ends. Nails should be centered in each slot, as shown in **Figure 23-21**. Steps for installing vinyl siding are given on page 677.
- Space fasteners no more than 16" apart on panels and 8" to 10" apart on accessories.

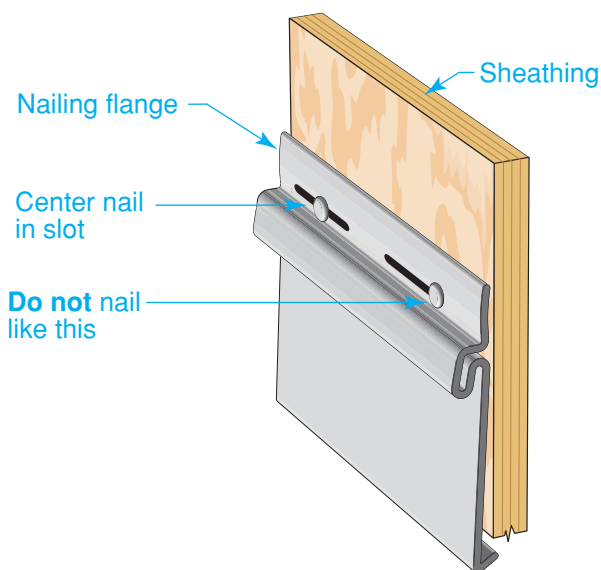


Figure 23-21 Nailing Details

Always Leave Clearance The careful placement of nails will prevent panels from distorting as they expand and contract.

- Center all fasteners in the nailing slots, except those at the very top of a corner post. This allows the siding to expand and contract. Also, leave a $\frac{1}{4}$ " space at joints, channels, and corner posts for expansion and contraction.
- For best appearance, locate any overlaps on panels in a way that minimizes their appearance. Stagger end laps a minimum of 24" or as suggested by the manufacturer. End laps should be 1" wide.

Cutting Techniques Several methods can be used to cut vinyl siding. Vinyl siding is often cut using a power miter saw. The blade should be a fine-tooth plywood blade. However, it should be mounted in the saw so that the teeth point *backward*: they should point toward the operator, not toward the saw fence. This is the opposite direction from normal blade installation. This results in a smoother cut through vinyl, especially in cold weather. Vinyl siding can also be cut with tin snips. For best results, do not close the blades completely at the end of a stroke. A third way to cut vinyl siding is by scoring it with a sharp utility knife or vinyl scoring tool.

Step-by-Step Application

Installing Vinyl Siding The following instructions are a general guide. Instructions specific to a particular siding product must always be followed closely.

Step 1 Snap a level chalk line along the bottom of the sheathing. Align the starter strips with this line and nail them into place around the house. Leave room for corner posts at each inside and outside corner.

Step 2 The ends of the corner posts should be $\frac{1}{4}$ " below the bottom of the starter strips. Plumb each post carefully. Then nail it to the sheathing through the uppermost nailing slot on each side. The post should "hang" on these nails. Continue nailing down the length of the post on both sides. Install all inside and outside corner posts in similar fashion (**Figure 23-22**).

Step 3 Apply housewrap or flexible self-adhesive flashing around windows, doors, exterior electrical boxes, and other openings. Overlap it as shown in **Figure 23-23**. The flashing should be wide enough to extend past the nailing flange of any accessory.

Step 4 A **J-channel** is a plastic or metal channel shaped like a J that is used to support trim. Nail J-channel to the sheathing wherever necessary to hold the ends of siding panels. This would include areas around windows, at gable ends, and where dormer side walls meet a roof. Follow manufacturer's instructions carefully.

Step 5 Place the first panel in the starter strip and nail it into place. Subsequent panels can then be held in place, locked to the previous course, and nailed. The ends of panels fit into J-channel around windows and doors. Leave a $\frac{1}{4}$ " gap between the siding and all corner posts and channels. (Increase the gap to $\frac{3}{8}$ " when installing siding in temperatures below 40°F (4°C) as shown in **Figure 23-24**.)

Step 6 Cut the siding as needed to fit under windows. Be sure to include space for an expansion gap. Check the siding with a level after installing every five or six panels. Adjust the panel's position slightly as needed to maintain level.

Step 7 The top course of siding may have to be cut to fit beneath the soffit. In this case, use a special siding tool called a *snaplock punch* to create a nailing flange along the cut edge. Use vinyl trim to cap the top of the wall as needed.

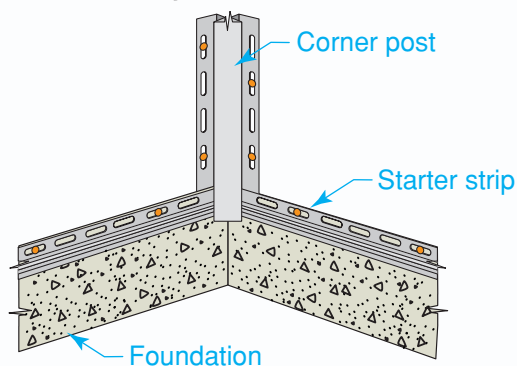


Figure 23-22 Corner Posts

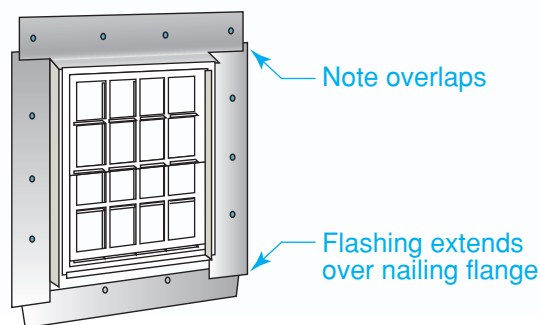


Figure 23-23 Window Flashing

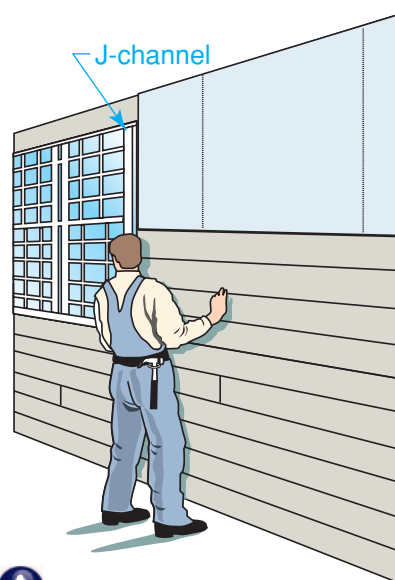


Figure 23-24 J-Channel

 Go to glencoe.com for this book's OLC for additional step-by-step procedures, applications, and certification practice.

REGIONAL CONCERNS

Vinyl Siding & Wind Always check local building codes for specific installation requirements for vinyl siding. In regions where high winds are common, local codes may include more stringent installation instructions.

Go to glencoe.com for this book's OLC for more information about regional concerns.

Cut with the siding panel facing upward, and guide the blade with a metal straight-edge such as a framing square. Cut part way through the panel, then snap the panel along the scored line.

Estimating Vinyl Siding

Most manufacturers of vinyl siding **indicate** the number of panels required to cover one square (100 sq. ft.) of wall area. For example, 12 pieces of 8" siding might cover one square.

Figure the area to be covered by multiplying the perimeter measurement by the wall height. Divide this total by 100 to find the number of squares. Multiply the number of squares by the number of pieces needed to cover one square (in our example, 12). For example, for a house having 947 square feet to be covered, you would need 114 pieces:

$$947 \div 100 = 9.47$$

$$9.47 \times 12 = 113.64, \text{ or } 114$$

Plywood Siding

When is primer used?

Plywood siding panels can also be used as an exterior wall covering. When this is done, sheathing is not required because the panels provide enough rigidity to the walls. Using plywood sheet siding has several advantages. It comes in many grades and surface textures, such as those shown in **Figure 23-25**. It covers large areas quickly, taking less time to install. Little material is wasted. By omitting sheathing, costs are reduced. Plywood siding panels are 4' wide. They come in standard

JOB SAFETY

CUTTING VINYL WITH A MITER SAW

Vinyl panels can be cut with a plywood blade mounted so that the teeth face the opposite direction from normal. However, never use this blade position to cut other materials. Also, never use this blade position with any other types of saw blades. Always wear suitable eye protection.

Go to glencoe.com for this book's OLC for more on job safety.

8' lengths as well as 12', 14', and 16' special lengths. Panels range in thickness from $1\frac{1}{32}$ " to $\frac{3}{4}$ ".

Preparation

The edges and ends of plywood siding panels should be sealed before installation. This prevents sudden changes in moisture

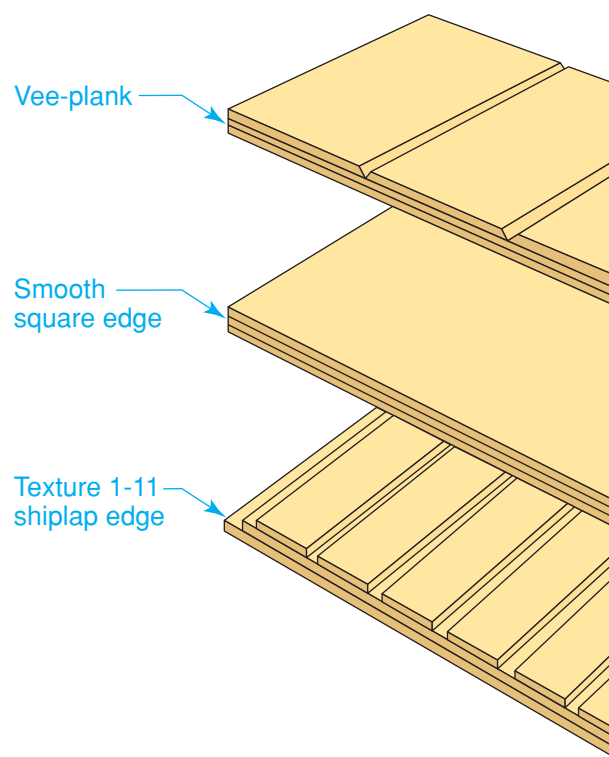


Figure 23-25 Plywood Siding Profiles
Many Choices Three of the many plywood siding styles available.



Science: Life Science

Molds Fiber cement siding is specially treated to resist molds. Molds are a type of fungus. They are related to yeasts and mushrooms. Molds are unable to grow without moisture, and they flourish in a damp environment. They reproduce by means of tiny spores which float in the air. Mold begins growing when the spores land on something wet. Like other fungi, mold will break down whatever substance it adheres to, so it can be very destructive to siding, even vinyl. How can you recognize mold on vinyl siding, and how should it be cleaned?

Starting Hint Mold can be different colors.

content caused by wet weather. Primer is used if the siding will be painted. A paintable, water-repellent sealer is used if the siding will be finished with a solid-color stain. To seal the panels, brush or roll the sealant over the edges of stacked panels. Any fresh edges created by cutting the panels during installation should also be sealed.

Application

Plywood siding is normally installed vertically, but it may be installed horizontally. All vertical edges should be supported by framing. Horizontal joints should be supported by blocking, as shown in **Figure 23-26**. To prevent staining of the siding, use galvanized, aluminum, or other non-corrosive nails.

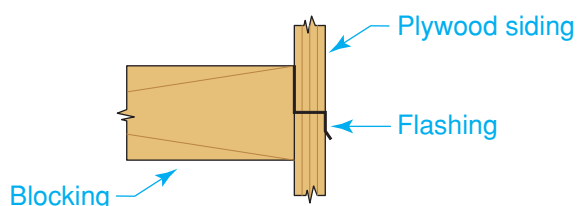


Figure 23-26 Horizontal Joints

Weather Detailing Horizontal joints should always be supported by blocking. The joint should be flashed as shown.

Builder's Tip

ASSEMBLING CORNER BOARDS Outside corner boards are nailed together before being nailed to the house. This ensures a tight joint and is much easier than nailing each board to the house separately.

Vertical joints between panels can be handled in two ways to keep out water. The joint must either be a shiplap joint or be a butt joint covered by a wood batten. Horizontal joints between panels should be lapped at least 1", shiplapped, or protected with Z-shaped flashing as in **Figure 23-26**. Flashing prevents water from entering the joint. Space panels $\frac{1}{8}$ " apart at sides and ends to allow for expansion and contraction.

Follow the nailing recommendations provided by the panel manufacturer or local codes. **Table 23-4** on page 680 provides some guidelines. Add corner boards and trim around windows after the siding is in place, as shown in **Figure 23-27**. Building paper or housewrap is usually not required by code. However, always check local codes to be sure.

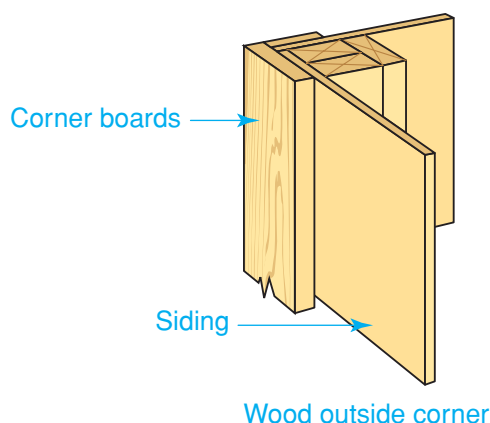


Figure 23-27 Corner Detail

Joint Coverage Outside corner detail for plywood panel siding.

Table 23-4: Framing and Nailing Schedule for Plywood Panel Siding

Panel Siding Thickness	5/16"	3/8"	1/2" grooved	1/2" flat	5/8" grooved	5/8" flat
Single-Wall Construction						
Maximum Stud Spacing		16" OC	16" OC	24" OC	16" OC	24" OC
Nail Size		6d	8d	8d	8d	8d
Over 3/8" Sheathing						
Maximum Stud Spacing	24"	24"	24"	24"	24"	24"
Nail Size	6d	6d	6d	6d	8d	8d
Approximate Nail Spacing ^(a)						
Edges	6"	6"	6"	6"	6"	6"
Intermediate Members	12"	12"	12"	12"	12"	12"

^(a)Use non-corrosive casing, siding, or box nails.

Stucco

In what type of climates is stucco popular?

In some parts of the country, a stucco finish is the most common type of siding. A stucco house is shown in **Figure 23-28**. *Stucco* is a durable product that is applied by trowel in several layers over reinforcing wire called

lath. The stucco itself is a mixture of clean water, bagged silica sand, Portland cement, and lime. It forms a hard coating that is all of one piece. It is particularly suitable for use in hot or mild climates. Stucco may have a natural cement color or be colored as desired.

If stucco is to be applied on houses more than one story high, balloon framing (see Chapter 14) or steel framing should



Figure 23-28 Stucco Siding

Regional Favorite The stucco exterior of this house provides a durable finish.

be used for the exterior walls. This reduces expansion and contraction that could crack or otherwise damage the stucco. The framing should be sheathed according to local building codes. However, plywood is commonly used. Stucco can also be applied to masonry surfaces such as concrete block. In such cases, code allows for a two-layer application instead of the standard three-layer application required over wood framing.

Portland-cement stucco that has been commercially prepared should be mixed and applied according to the manufacturer's instructions. If the material is mixed on site, it is generally one part Portland cement, three parts sand, and a portion of hydrated lime equal to 10 percent of the Portland cement by volume. When describing masonry mortars, cement is the first ingredient listed followed by the lime content and then the proportion of sand.

Application

On a wood-framed house, stucco is typically applied over metal lath as shown in **Figure 23-29**. Acceptable types of lath include:

Zinc-Coated or Galvanized Metal This may have large openings or small openings.

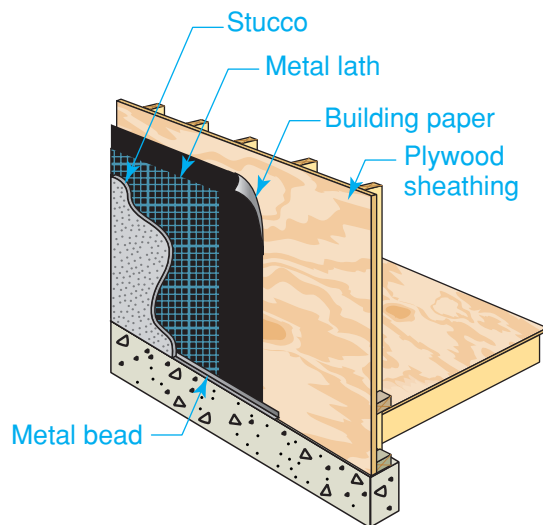


Figure 23-29 Installing Stucco
Wood Framing Stucco applied on lath over plywood sheathing.

Galvanized Woven-Wire Fabric This material may be 18-gauge wire with 1" maximum mesh, 17-gauge wire with 1½" maximum mesh, or 16-gauge wire with a 2" maximum mesh.

Galvanized Welded-Wire Fabric This may be made of 16-gauge wire with 2" × 2" mesh and waterproof paper backing. It may also be made of 18-gauge wire with 1" × 1" mesh without paper backing.

The lath should be held at least ¼" away from the sheathing so that the lath will be embedded completely as the stucco is forced through it. Galvanized furring nails, metal furring strips, or self-furring lath are used for this spacing.

Nails used to attach the lath should be 1½" long with an 11 gauge shank and a ⅞" diameter head. Staples can be used instead if permitted by local codes. They should be ⅞" long and 16 gauge in size.

Traditional stucco should be applied in three layers to a total thickness of about 1".

Scratch Coat The first layer is called the *scratch coat*. It should be forced through the lath and worked so as to embed the lath at all points. The surface should be scratched or scored to provide a rough surface that helps the next layer to hold.

Brown Coat The second layer is called the *brown coat*. It contains more sand than the scratch coat. This makes it easier to work with but it is not as strong.

Finish Coat The third layer is the *finish coat* (sometimes called the *top coat* or *color coat*). Colorants are added to this layer, which is only about ⅛" thick.

Builder's Tip

SAND FOR STUCCO Inexpensive sand that is sometimes called *yard sand* contains impurities that can cause stains to appear in the stucco. Always use silica sand when mixing stucco.

Newly applied stucco should be shaded and kept moist for three days. Do not apply stucco when the temperature is below 40°F (4°C). It sets very slowly, and it may freeze before it has set.

As with other siding materials, stucco should not be considered waterproof. Water can seep through the material itself or through tiny cracks in the surface that are sometimes created as the house settles. Always follow local codes for the installation of sheathing paper. This typically includes requirements for creating a drainage plane behind the stucco. A **drainage plane** is a gap or series of gaps behind the siding that allows water to drain freely. Without a drainage plane, the stucco would stick to the sheathing paper and block water draining. One way to create a drainage plane is to cover the sheathing with wrinkle wrap. This is a flexible sheet material with an irregular surface that promotes drainage.

Fiber Cement Siding

What methods could be used to contain cutting dust?

Fiber cement is a material that has become very popular for siding. It can be formed into various shapes, including sheets, planks, and even bevel siding. The substance is made of Portland cement, ground sand, cellulose fiber, additives, and water. The ingredients are mixed, formed into siding boards, and cured in an autoclave. An *autoclave* is a chamber filled with steam under high pressure. The result is a product that will not burn, rot, or split. It resists mold, mildew, fungus, salt spray, UV rays, and pests such as termites. It contains no defects that must be removed before installation.

Though fiber cement can be formed into shingles, it is more commonly sold as planks, as shown in **Figure 23-30**. These planks are $\frac{5}{16}$ " thick, 12' in length, and available in widths from $5\frac{1}{4}$ " to 12". Planks are available pre-primed or unprimed.



Figure 23-30 Fiber Cement Siding

Wood Texture This house is sided with fiber cement planks. The inset on the lower right shows a detail of these planks.

Working with Fiber Cement

Fiber cement products should be stored flat and kept dry. If the material is installed wet, butt joints will open up as the material shrinks. Individual planks are dense and fairly heavy, so take care when lifting them. Long planks should be carried on edge to prevent them from snapping across their width.

Cutting, drilling, or sanding fiber cement releases a cloud of fine dust that may contain silica. Inhaling this dust over time can cause silicosis, a disabling lung disease (see Chapter 3). A NIOSH-approved respirator is recommended if exposure to the dust will exceed normal limits. Consult the product's material safety data sheet (MSDS) for additional information.

Cutting Fiber Cement There are several methods for cutting fiber cement. The best methods are to score it with a blade and then snap

JOB SAFETY

REDUCING DUST EXPOSURE When using a circular saw to cut fiber cement, work outdoors in an area where wind will blow any dust away from you. Never cut this material indoors using a circular saw.

Go to glencoe.com for this book's OLC for more on job safety.



Figure 23-31 Fiber Cement Dust Collection Safety Feature The clear housing on this circular saw helps to contain the fine dust created when fiber cement products are cut.

it, or to use pneumatic or handheld shears that slice through the material. Either of these methods minimizes the amount of fine dust that is created during cutting. It is also possible to cut the material with a circular saw. However, the blade should be approved by the siding manufacturer for use with this material, and the saw should be fitted with a special dust collection system. For low to moderate cutting volumes, the saw can be fitted with a dust guard as shown in **Figure 23-31**. For better dust collection, the saw should also be connected to a shop vacuum fitted with a HEPA filter.

Application

Fiber cement planks are installed much like plain-bevel siding. Each plank overlaps the one below and is nailed to the sheathing. Building paper or housewrap may not be

required by code, but fiber cement manufacturers generally recommend it. Joints between planks should be no more than $\frac{1}{8}$ " wide. Use a high-quality paintable caulk to seal butt joints and gaps between siding and trim.

Nails should be of 6d hot-dipped galvanized steel or stainless steel and have a blunt or diamond point. Local codes may allow the use of thinner siding nails in some cases. Nails must be long enough to penetrate at least 1" into the wood. When metal framing is used instead of wood, the siding is installed with corrosion-resistant, Phillips-type, bugle-head screws.

Section 23.4 Assessment

After You Read: Self-Check

1. List the advantages vinyl siding has over wood siding.
2. How much space should be left under the nail head when securing vinyl siding?
3. Which type of siding serves as both sheathing and exterior wall covering?
4. What materials are combined to form stucco?

Academic Integration: English Language Arts

5. **Comparison** Write a two-paragraph comparison of stucco and fiber cement as siding materials.

Go to glencoe.com for this book's OLC to check your answers.

Review and Assessment

Section

23.1

Chapter Summary

Siding is made from many materials. Solid-wood siding is the type of siding most commonly used on houses. It must be a high grade of material for maximum durability. Steps should be taken to prevent problems associated with water and water vapor.

Section

23.2

Plain-bevel wood siding is installed in overlapping courses. The exposure of each course is important when determining the layout. Tight-fitting joints prevent water seepage.

Section

23.3

Wood shingle siding may be installed in several ways that result in different looks. Various grades of shingles may be mixed, depending on the method used.

Section

23.4

It is important with sidings such as vinyl, fiber cement, and plywood panels to follow manufacturer instructions closely. This ensures the most durable results. While cutting and handling fiber cement, use extra safety precautions to reduce dust exposure.

Review Content Vocabulary and Academic Vocabulary

1. Use each of these content vocabulary and academic vocabulary words in a sentence or diagram.

Content Vocabulary

- siding (p. 658)
- back-priming (p. 663)
- story pole (p. 664)
- undercourse (p. 670)
- J-channel (p. 677)
- drainage plane (p. 682)

Academic Vocabulary

- traditional (p. 661)
- overall (p. 670)
- indicate (p. 678)

Speak Like a Pro

Technical Terms

2. Work with a classmate to define the following terms used in the chapter: *building paper* (p. 661), *building felt* (p. 661), *house-wraps* (p. 661), *pre-priming* (p. 663), *exposure* (p. 663), *corner strips* (p. 665), *corner boards* (p. 665), *scarf joint* (p. 666), *side-wall shingles* (p. 670), *dimension shingles* (p. 670), *rebutted-and-rejointed shingles* (p. 670), *square* (p. 672), *nailing flange* (p. 674), *nail hem* (p. 674), *buttlock* (p. 674), *snaplock punch* (p. 677), *stucco* (p. 680), *lath* (p. 680), *zinc-coated or galvanized metal* (p. 681), *scratch coat* (p. 681), *brown coat* (p. 681), *finish coat* (p. 681), *fiber cement* (p. 682), *autoclave* (p. 682).

Review Key Concepts

3. List common siding materials.
4. Explain the procedures used to prevent moisture from seeping into or behind siding.
5. Summarize how to install bevel wood siding.
6. List the four coursing styles for wood shingles.
7. Identify other types of siding.
8. Describe the appropriate safety techniques for installing siding.

Critical Thinking

9. **Discuss** When installing vinyl siding, what consequence may result from driving nails too tight?

Academic and Workplace Applications

STEM Mathematics

10. **Estimating Perimeter** Aluminum or vinyl siding can be installed to the exterior of a building by first attaching it to a starter strip which runs around the perimeter of the building. When estimating starter strip needs, include an additional 10% for trim and waste. What is the number and cost of 10' lengths of starter strip at \$2.99 per length for a rectangular $32' \times 56'$ structure?

Math Concept To find the perimeter of a rectangle, add the length and width and multiply the sum by 2.

Step 1: Find the perimeter of the structure.

Step 2: Multiply the perimeter by 110% to figure a 10% trim and waste allowance.

Step 3: Divide the total by the length of a section of starter strip. Round up to the next whole section.

Step 4: Multiply the number of sections needed by the cost of a section.

STEM Engineering

11. **Shingle Spacing** Shingles are generally spaced $\frac{1}{8}"$ to $\frac{1}{4}"$ apart. This allows them to expand and prevents buckling. Suppose a carpenter or siding installer were to decrease the spacing to $\frac{1}{16}"$ or $\frac{1}{32}"$ apart in order to increase protection against weather and moisture. What issues may occur because of this spacing adjustment? Write a one-paragraph response.

21st Century Skills

12. **Cross-Cultural Skills: The Bilingual Workspace** Think about working with on a job site where both English and Spanish are spoken. State some reasons why it would be helpful to know both languages in order to communicate. Discuss some of the possible difficulties that may result from a language barrier.

Standardized TEST Practice



True/False

Directions Read each of the following statements carefully. Mark each statement as either true or false by filling in T or F.

- ☐ T ☐ F 13. Woods used for siding should have the ability to accept paint or stain, be easy to work with, and be dimensionally stable.
- ☐ T ☐ F 14. Wood siding that will be painted does not need to be primed before it is installed.
- ☐ T ☐ F 15. When installing vinyl siding, nails should have heads at least $\frac{3}{16}"$ in diameter.

TEST-TAKING TIP

To help your concentration, try to minimize your anxiety when you are taking a test. For example, do not worry about whether you should have studied more.

*These questions will help you practice for national certification assessment.