

Lesson 8: Roofing Materials

Roofing materials come in a variety of forms. For agricultural structures, three types of roofing materials are commonly used. While all of them can offer good protection from the weather, each has its advantages and disadvantages.

Types of Roofing Materials

The three types of roofing materials most commonly used in agricultural structures are fiberglass shingles, asphalt in roll or shingle form, and metal roofing. Asphalt is a combination of crushed rock and an adhesive. Asphalt shingles are used extensively on homes. Metal roofing can be made of steel, tin, aluminum, or copper. Steel roofing is commonly used and is available in either galvanized or painted form. Galvanized metal is metal that is coated with zinc oxide to prevent rusting. Painted or galvanized metal roofing is commonly used on machine sheds and other agricultural structures.

Other materials, like cedar shingles or tile, are sometimes used but generally only for cosmetic reasons; they can be quite costly.

Roofing material is sold by the square, a square being equal to 10 feet by 10 feet, or 100 square feet of finished roofing. The delivery of roofing materials to the work site is often an option and may be worthwhile, since most delivery trucks are equipped to deliver materials to the rooftop, which is an advantage when dealing with a large amount of roofing material. Knowing the roofing material's warranty and how the roofing must be installed to comply with the warranty agreement is important. Factors such as proper roof ventilation may be required if the warranty is to be valid.

Advantages and Disadvantages of Roofing Materials

Before choosing a roofing material for a particular structure, the advantages and disadvantages of each type of material available should be assessed. Longevity, cost, and maintenance requirements are some factors used when evaluating roofing materials.

Asphalt roofing material has the advantage of being lower in cost than either metal roofing or fiberglass shingles. Asphalt in roll form usually

costs the least of the different types of roofing materials discussed in this lesson; it is often considered the least attractive as well. An advantage of asphalt in roll form is that installation is simple. A disadvantage of asphalt roofing material is its relatively brief life span in comparison with the other types. While different brands may vary in their life span, under normal conditions they last for 15 to 25 years. Proper maintenance will involve refastening materials that come loose and repairing any leaks that develop. Another disadvantage of asphalt roofing is that it will burn readily.

Fiberglass shingles are moderate in cost; they are more expensive than asphalt products but cost less than painted metal roofing materials. They also have a longer life span, around 30 years. A disadvantage of fiberglass shingles is that they are flammable. Again, maintenance involves keeping shingles fastened securely and any leaks repaired.

Galvanized metal comes in a variety of lengths, gauges, and ribbings, which are raised areas in the metal that add strength. The material is relatively inexpensive, being comparable in price to asphalt roofing. It is very fire resistant and has a life span of 50 years or longer. Galvanized metal is a very durable material, and maintenance requirements are limited to simply keeping it tightly secured to the roof. To increase its life span, the metal may be coated with rust-retardant roofing protectant, although this material may not be needed for years after the roof's initial installation. A disadvantage of galvanized metal is its plain silver appearance, which may not make it suitable for all uses. Another disadvantage of metal roofing is the noise caused by rain or hail striking the roof, especially in a building inhabited by people or animals, like a house, office, or barn. Noisy barns can be unsettling to some animals, especially hogs.

Like galvanized metal, painted metal comes in a variety of lengths and gauges. However, as its name indicates, it comes in a variety of colors and can be attractive. It is also fire resistant and can have a long life span of 30 or more years, depending on the gauge, finish, and maintenance. Painted metal roofing is generally more expensive than asphalt shingles, galvanized metal, or fiberglass roofing.

Building Construction

Maintenance for both types of metal roofing generally involves keeping the material secured tightly to avoid leaks and keep the wind from tearing off the metal sections. In some locations, periodic washing of the roof may extend the life span considerably. In areas where trees overhang the roof, leaves or bird droppings may accumulate and have a caustic effect on the metal, causing premature rusting.

Structural Components of a Roof

The structural components of a roof include the rafters or trusses that make up the roof support systems discussed in the previous lesson. In addition, roofs using asphalt or fiberglass roofing materials consist of a solid decking system to which the roofing material is attached. The decking may be either some form of sheathing material, such as plywood or oriented-strand board, or dimensional lumber, usually $\frac{3}{4}$ " thick. The decking is nailed or screwed over the top of the roof support system.

Metals may be installed over solid decking, but using decking would increase the cost and weight of the roof system. Instead of decking, purlins are used. Purlins are pieces of dimensional lumber, commonly 1" \times 4", in. When attaching asphalt shingles, one of the most common types of roofing, the first step is to nail or staple a layer of building felt, or underlayment, to the roof. Building felt is a tar-soaked fabric that will repel water. It helps to seal the building and prevent leaks. The felt is placed across the length of the roof horizontally starting at the bottom of the roof, with successive layers overlapping about 4 inches. A special metal strip called a drip edge is applied to the bottom and sides of the roof over the underlayment. It prevents moisture

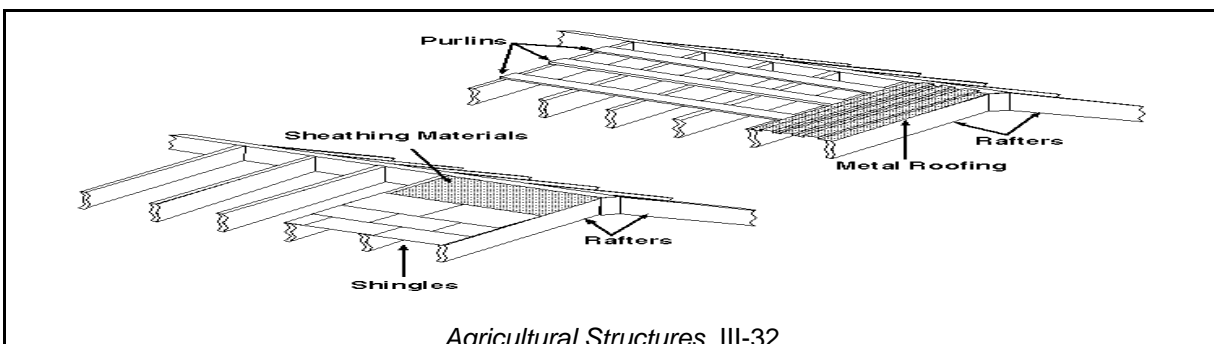
varying lengths. The purlins are nailed perpendicular to the rafters. They provide a surface to which the metal roofing is attached. The spacing of the purlins is dependent on many variables, such as the roof span, the strength of the material used for the purlins, and pitch. Figure 8.1 provides an illustration of the structural components of both types of roofs.

Attaching Roofs

Roofing material in roll or shingle form is usually fastened with galvanized or sometimes aluminum nails. These materials resist rusting, which can cause rust-colored stains on the roof. The nails are usually $1\frac{3}{4}$ inches long, although their length can vary according to the application or the recommendation of the manufacturer of the roofing material. They have a large, flat head to hold the material securely and resist tearing the shingle. Nails are usually used at a rate of approximately 1_ pounds of nails per square of roofing material. Shingles may also come with an adhesive on them to help secure them to the decking. The adhesive is often covered with a paper strip that is pulled off at the time of installation.

from seeping under the underlayment, which would lead to mold or rot.

After the felt and drip edge are in place, the shingles can be applied to the roof, starting at the bottom. Each successive layer or course of shingles will overlap the layers below, allowing water to drain off without the roof leaking. Two types of shingles, T-lock and three-tab shingles, may be used on roofs, although three-tab shingles are the most common.

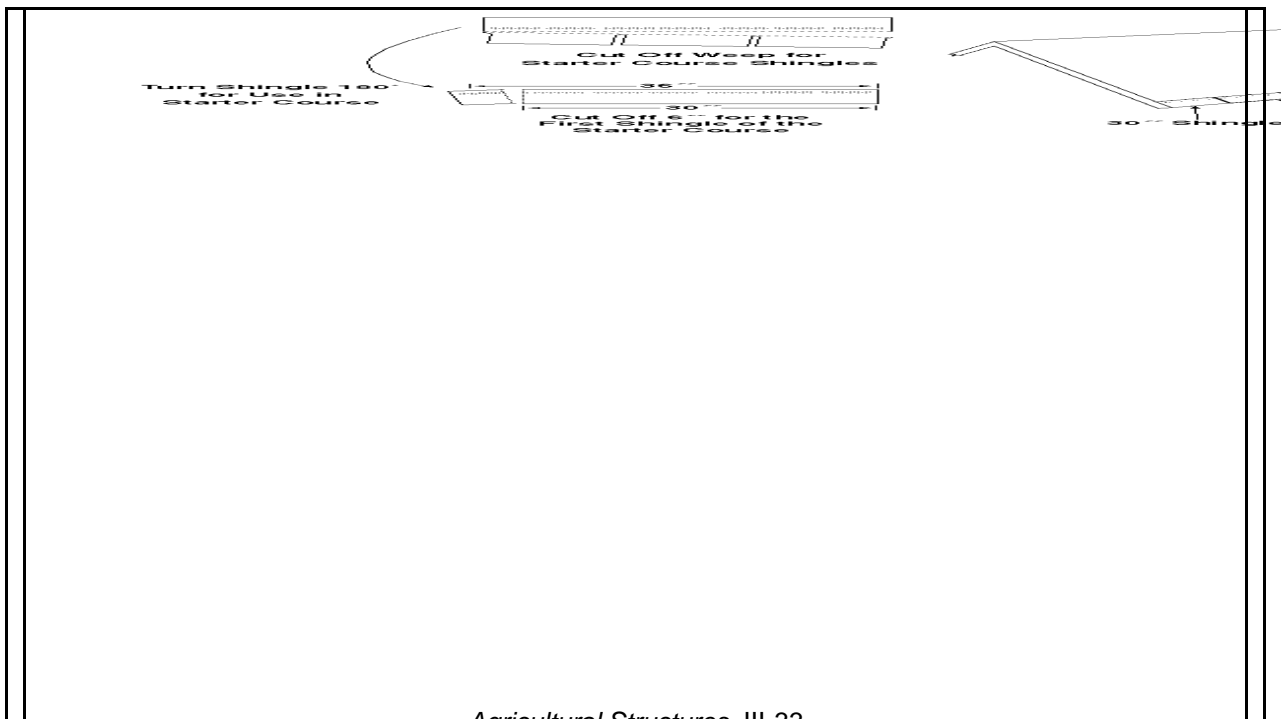


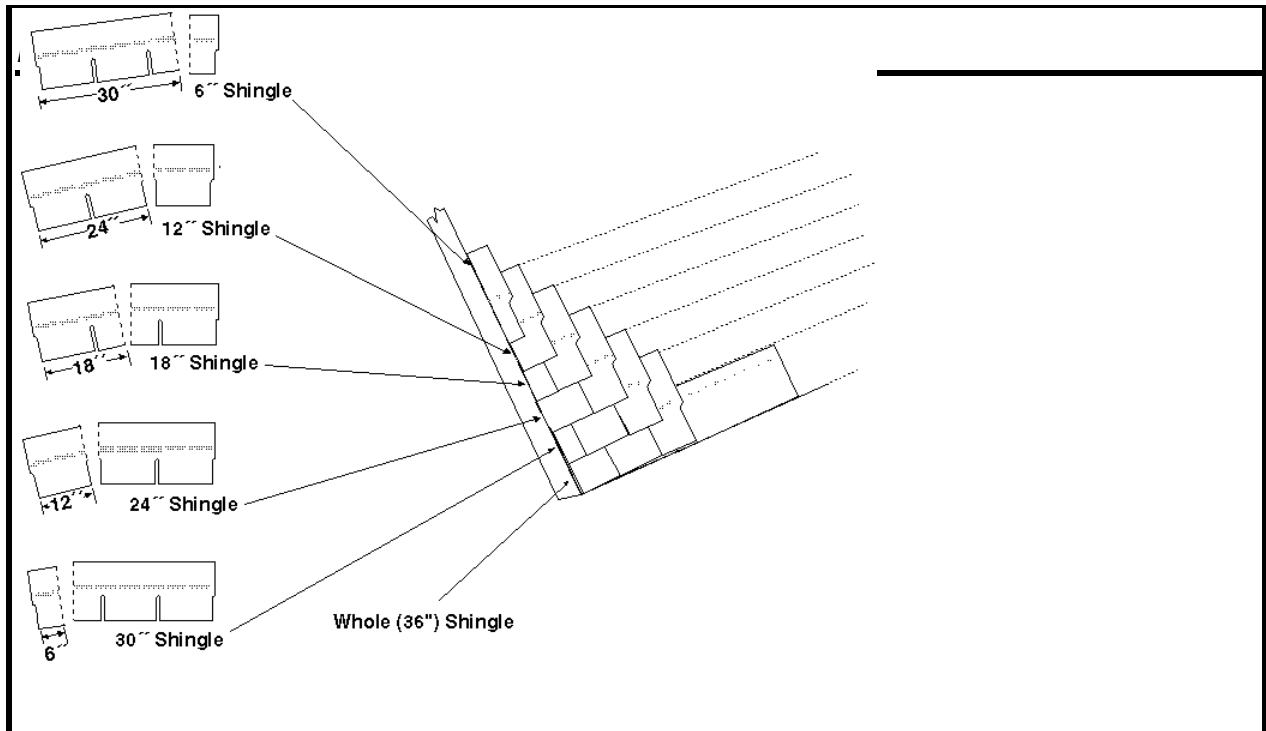
Lesson 8: Roofing Materials

When attaching three-tab shingles, the first course, or starter course, is made of half shingles. The shingle is cut lengthwise along the top of the tabs, making it rectangular. The first shingle in the starter course will need to be cut to a length of 30 inches to offset the end with the first course of full shingles, as shown in Figure 8.2. The long edge of the shingle is placed along the bottom edge of the roof as square to the edge as possible. A hand level should be used to make sure the first course is level. Nails should be applied in the sealer strip that runs lengthwise above the grooves or weeps in each shingle, with one nail on each end of the shingle and above each weep (four or less per shingle).

Once the starter course is down, the remaining courses can be laid. The starter course will be completely covered by the first course of full shingles. The shingles in each remaining course overlap the previous course halfway, or

just above the top of the weeps. The weeps of each course should be equally staggered from the previous course to form a brick-type pattern, illustrated in Figure 8.3. To do this, the first shingle in each course needs to be cut in six-inch increments, producing shingles that are 30, 24, 18, 12, and 6 inches long. These shingles are then laid out along the side of the roof in sequence, starting with a full shingle (36 inches long) and continuing across the roof with full shingles to the other side. The last shingle in the course will be cut even with the side of the roof. The second course will start with a 30-inch shingle, the third with a 24-inch shingle, and so on, creating a pattern that is repeated every six rows. The cut-off material at the beginning of each course may be used at the other end of a course. Any pieces over 12 inches long (a full weep) may be used on the peak of the roof.

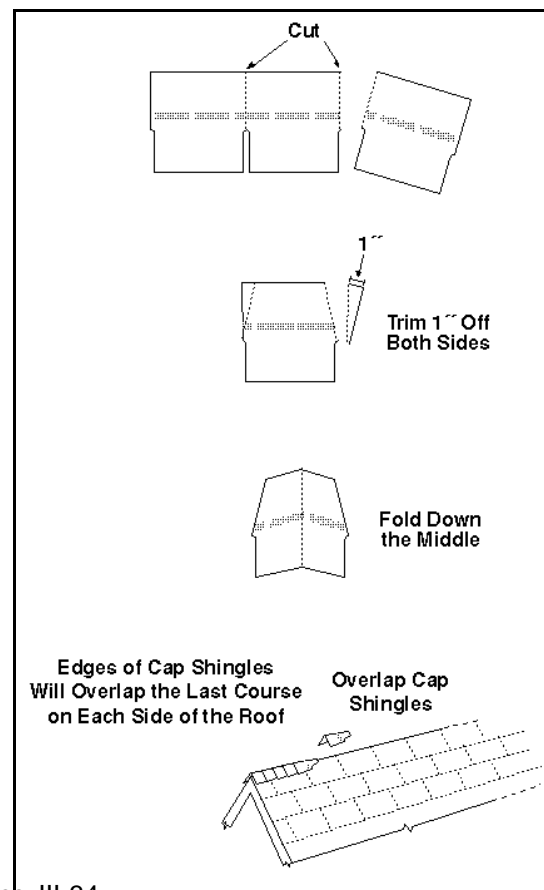




Two methods are used to finish the cap or final course covering the roof's peak. One method is to cut three-tab shingles into three sections and lay them across the peak overlapping the top courses on each side of the ridge. Figure 8.4 shows how to cut a full shingle for cap shingles and how each cap shingle should be trimmed prior to attaching it to the roof. Another method involves using special pre-made cap shingles on the peak.

Whichever method is used, these shingles must also overlap each other to prevent rain from getting under them. The direction of overlap Galvanized or painted metal roofing is most often installed with ring shank screws or nails. These fasteners come with a neoprene or lead washer attached. They are generally 2½ inches in length. When attaching the roofing materials, the ribbing running the length of the material is overlapped. The nails or screws are then placed through the ridges of the roofing material, not in the flat areas. The placement of fasteners will vary depending on the type of ribbing; the manufacturer's recommendations, which are usually printed on labels for the roofing, should always be followed. The fasteners are generally used at rate of 1½ pounds or 100 fasteners per square. When working with metals, aluminum and galvanized metal materials should not be used together. This combination will result in an electrolyte reaction that quickly causes corrosion.

depends on the normal wind direction. If the wind is commonly from the north, the shingles should start at the south end of the roof. This will leave exposed edges of the cap shingles facing south, where the wind and rain cannot get under them as easily.



Lesson 8: Roofing Materials

Summary

Roofing materials for agriculture structures will generally be made of asphalt, fiberglass, or metal, and each material has its advantages and disadvantages. Roofing material is applied to either a solid decking surface or a purlin system that is attached to the top of the rafters or trusses. The material must be attached carefully using the proper technique to ensure that the roof is secure and watertight.

Credits

Ball, John E. *Tools, Steel Square, and Joinery*. Vol. 1 of *Carpenters and Builders Library*. Revised by John Leeke. New York: Macmillan, 1991.

Boyd, James S. *Practical Farm Buildings*. 3rd ed. Revised by Joshua L. Reynolds. Danville, Ill.: Interstate Publishers, Inc., 1993.

Lindley, James A., and James H. Whitaker. *Agricultural Buildings and Structures*. Rev. ed. St. Joseph, Mich.: American Society of Agricultural Engineers, 1996.

