HOMEOWNER REPAIR GUIDE

REPLACING A SHINGLED ROOF

For do-it-yourself repairs

The basic principle of all types of roofing is that they are designed to shed water. They do this by several means. First, they physically have a slope or pitch to them, so gravity will make the water roll off. Next, the surface is covered with a water resistant material. And finally, that material is installed in a manner that will not allow water to collect or be restricted in its flow off the roof.

When one or more of these basic design elements breaks down, the eventual result is a leak. The most common causes of leaks are when the roofing material loses its resistance to water, or when an object that protrudes through the roof material develops a leak around it.

ROOF EVALUATION

You can usually assess the condition of your roof from the ground (with the aid of a pair of low-power binoculars). As shingles age and weather, the oils that keep them flexible dry out. The visible signs of this aging are curling shingles, missing granules, shingles that are raised up, or torn or missing shingles. All are indications, visible from the ground, that the general condition of the roof is not good. The larger the percentage of roof area having these conditions, the more urgent the need for a new roof. But, if these conditions exist at all, take it as your first warning sign that your roof needs replacement.

According to most experts, you should have no more than two layers of shingles on a roof at one time. So, if you already have two layers, they should be stripped off before replacement with new shingles. If you have only one layer, you can add another layer on top, but be aware that the life expectancy of a new roof installed on top of an existing one will usually be less. Also, if you have irregularities in your present roof, you can expect to see them work their way through your new one. For these reasons, it is best to install a new roof directly on top of the roof sheathing. That will provide the best job.

MATERIALS

For your new roof, you have choices in the composition and quality of the materials to be used – especially the roof felt, flashing, and shingles. Roofing supplies are commonly sold in units called "squares." Each square is the amount of material needed to cover a 100-square-foot area (10' x 10'). For example, three bundles of shingles will cover one square.

ROOF FELT AND UNDERLAYMENT

Use 15# or 30# **roof felt**. The numbers refer to the weight of the paper needed to cover a square; thus, 30# felt is thicker than 15# felt. There is a type of **waterproof roofing underlayment** that can be applied to specific areas that are prone to ice dam/water build-up that will help to prevent water entering the house from underneath the shingles. This product is called *Ice Guard* or *Ice Shield*. It is a little bit more expensive, so it is not generally used throughout the roof, but usually in the lower few feet of the roof where ice dams are a problem.

FLASHING

Flashing is the metal used to seal the roof where it joins other roof sections, house walls, or around obstructions such as chimneys. Don't try to re-use the existing flashing – it's best to use all new flashing with a roof replacement. Aluminum is the most popular metal now used, although copper and galvanized steel were used for many years. Flashing comes in many widths, but 24" is usually standard. You'll want a gauge of .025 or heavier.

SHINGLES

An asphalt **three-tab shingle**, made of either a fiberglass or organic base, is the most common type of shingle now used. Although shingles will usually be referred to as "asphalt" or "fiberglass," the difference isn't so clear-cut. Part of the confusion lies in the fact that fiberglass shingles are made from asphalt, and really should be called "fiberglass-asphalt shingles." Both types of shingles have a base mat that is surfaced with mineral aggregates.

SHINGLE TYPE	BASE MAT AND CHARACTERISTICS
Organic asphalt	Base mat consists of felt made from rags, and paper wood pulp that is saturated and coated with asphalt. May be a better choice if your roof will be installed during the late fall or winter months.
Fiberglass-asphalt	Mat is made from glass fiber mat coated (not saturated) with asphalt, so the shingles don't get as soft during hot-weather installations and aren't so easily damaged. More difficult to work with in very cold weather because they become brittle and can crack if flexed; a better choice for a summer installation. Better fire rating than organic asphalt.

Both types of shingle are commonly used today, and both are considered acceptable. Your choice will generally depend on aesthetics, availability, and cost – and maybe on the time of year you'll be installing the shingles.

Shingles usually come three bundles to a square. They are described by the number of years they are guaranteed (20-year, 25-year, 30-year...), which correlates to the quality and weight of the shingle. Generally, the more expensive shingles, whether organic asphalt or fiberglass-asphalt, will come with a longer warranty, some extending to 25–30 years.

VENTS

Venting of roofs has become standard, as a way of allowing hot, moisture-laden air to escape from beneath the roof and extend the life of the shingles by keeping the attic cooler so that the shingles won't dry out or curl. Vents also remove moisture that causes mold, wood rot and problems with the insulation. They should be installed at the same time as the roofing material. There are many types of vents to choose from, each with a "best application" and a different installation method: soffit vents, "mushroom cans," ridge or gable vents and powered ventilators. The different types can be used singly or in combination, but there should be one square foot of venting for each three hundred cubic feet of attic space.

BEFORE YOU START

PERMITS

A permit may be required for a new roof; check with your city's Building Department before you start, to make sure you meet their requirements. (In Cleveland Heights, you need a permit only if the job involves replacing any of the supporting structure of the roof – joists, beams, etc. – or if all the sheathing will be replaced. If you will be applying a second layer of shingles over an existing layer or replacing only part of the roof sheathing, no permit is needed.)

TEMPERATURE: BETWEEN 50° AND 75°

It's best to install your new roof when the daytime temperature will be between 50° and 75°. Below 50°, shingles can develop hairline cracks that shorten their life; above 75°, walking on the roof during installation can remove the protective granules and shorten the life of the shingles.

If you're stripping off the old shingles, take this opportunity to check the condition of the roof deck for any deterioration or rotting, and replace any wood necessary. (This is also a good chance to blow insulation into your finished or semi-finished attic; use baffles for ventilation.)

TIP: PROTECT YOUR ATTIC

If you are tearing off the old roof, it's almost guaranteed that debris will come through and make a mess in your attic. Take time to cover any items with tarps that you have stored in an unfinished attic or in the knee wall area of a finished attic, so they are protected during the re-roofing.

INSTALLATION

1. **Ice Guard.** The first item you should install after the wood sheathing is completed is rubberized roofing underlayment (i.e., Ice Guard) along the bottom three feet of the roof. While Ice Guard is self-adhesive, you should make sure that you wrap it around the bottom edge of the deck and secure it to the fascia board with a few staples before the gutter is replaced. Also, center a piece of Ice Guard along each valley with the sides extended up the adjacent sections of the roof, to help protect these vulnerable areas from water leakage. (The valley flashing will be placed over the Ice Guard and nailed in place – see below.) The Roofing Materials Manufacturing Association suggests that the Ice Guard also be positioned along dormers and chimneys before the metal flashing is installed.
2. **Roofing felt.** After the Ice Guard has been installed, cover the remaining roof area with roofing felt. Install each piece of felt paper parallel to the bottom edge of the roof, overlapping the previous piece by 2 to 4 inches. Roofing felt is usually stapled down with a staple gun, making it secure enough to walk on without slipping or tearing. (If you will be installing a vent that protrudes through the roof deck, first cut a hole in the sheathing for the vent; cover the hole with felt and then cut through the felt.)
3. **Drip edge.** Next, install a metal **drip edge** at the bottom edge of the roof. Nail the drip edge in place with roofing nails spaced 12" apart. It's also a good idea to install drip edge along the rake edges of the roof (the sides sloping down from the peak), so the shingles can be extended on top of the drip edge and out from the roof a bit, allowing water to drip freely away from trim and siding. The drip edge along the rake edges is nailed *on top of* the roofing felt, after felting the roof.
4. **Valley flashing.** Then, install the flashing. In a valley (the area where two roof sections join), first butter the area with plastic roof cement. Then, crease the flashing, center it over the valley and push it into the cement. Nail along the edges only, about 8" apart.

FLASHING WALLS, CHIMNEYS AND DORMERS

You also need to flash any places where the top of the roof meets a vertical house wall. Here, insert one side of the creased flashing up underneath the bottom row of wood siding or shingles about 8"; then, after the roofing shingles have been installed, use roof cement to butter the bottom of the other side of the flashing, lay it on top of the shingles and nail the edge, and cover it with cut shingle tabs cemented in place *(Illustration 1)*.

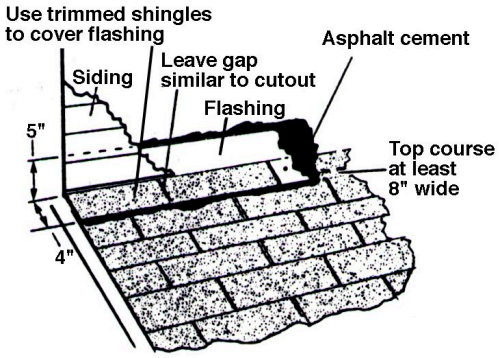


Illustration 1: Flashing between the top of the roof and a vertical wall

Use step flashing (smaller rectangles of metal flashing) against the side of a chimney. Weave the lower edge with the shingles as they are installed around the chimney *(Illustration 2)*. Then, place cap flashing over the step flashing. The upper edge of the cap flashing should be bent about 3/8" and inserted into a groove cut into the side of the chimney and mortared in place *(Illustrations 3 and 4)*.

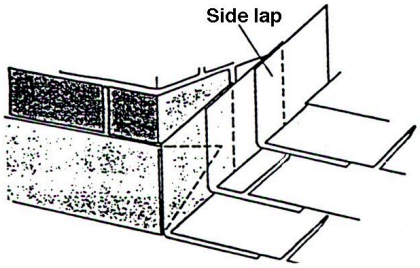


Illustration 2: Step flashing against chimney

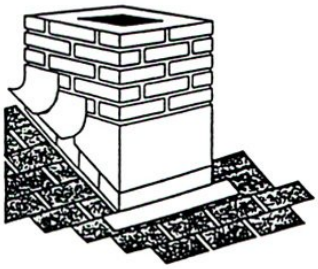


Illustration 3: Front and side cap flashings set into chiseled mortar joints and mortared into place

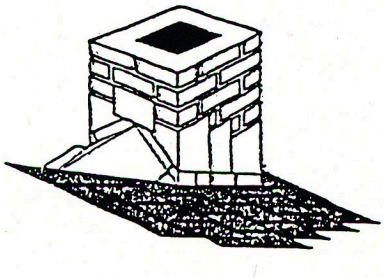


Illustration 4: Rear corner cap flashings (install type suitable to situation)

Step flashing is also used along dormers and other walls that extend up from the rake slope of the roof. Insert one side of the flashing piece under the wood siding or shingles, and then weave the lower edge with the shingles as they are installed, as you did along the chimney *(Illustration 5)*.

For soil pipes, use pre-made flashing collars that you simply slip over the pipe and interweave with the shingles.

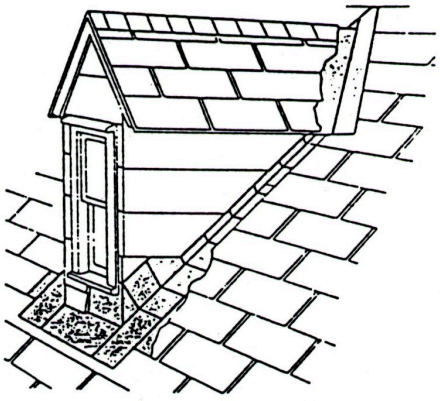


Illustration 5: Step flashing against dormer wall, with one side inserted under wood siding and the other woven into the roof shingles

SHINGLING

Now, you are ready to shingle. Each shingle requires four roofing nails – a lot of hammer swinging by the time you install all your shingles. So, it pays to develop a rhythm for driving nails. You might also consider renting an air-powered nailer for the job. You'll need to follow safety precautions and take care to adjust the pressure properly to avoid driving the nails too deep into or through the shingles – but this tool can be well worth the cost if used properly.

1. **Starter row.** Like the felt, you start installing shingles at the bottom. But, for the first row, cut the 5" tabs off and slide the shingles down, so that the sealer strip is next to the gutter. This places the sealing strip at the edge of the roof, to seal down the first row against wind tear-off. Then, nail another row of shingles right side up directly on top of this first row.

2. **Following rows.** The next row of shingles should just cover the slits in the bottom row to ensure proper spacing. (Improper spacing can void the manufacturer's warranty.) You should also keep the lines between the tabs lined up; the line between each tab should fall in the middle of the tab on the shingle below it to get the maximum weather coverage *(Illustrations 1 and 2)*. As you add rows of shingles, it's important to keep the rows straight. Use a chalk line to make straight lines you can follow. You work your way up to the peak this way.

3. **Rake edges and vents.** Usually, you let the rake edges go until the end, and then trim them all at once along the drip edge with a razor-blade knife. If you are installing vents, follow the manufacturer's directions for applying shingles around them.

4. **Ridge cap.** On the top, nail a ridge cap to cover the peak. Cut the tabs into single widths, and nail them from one end, overlapping as you did on the roof *(Illustration 1)*. Face the nailed end of the shingles in the direction from which the prevailing wind blows.

CLEAN UP

At this point, all that is left is clean up. You can rent a magnetic roller to roll through your yard to pick up any loose nails before they injure feet or damage tires. It will take a couple of weeks of sunlight to soften and activate the self-sealing strip of asphalt on the underside of the shingle and give you a good seal. Then, you have only to wait for the rain to start to appreciate your new roof.

Home Repair Resource center

Home Repair Resource Center empowers homeowners to maintain their homes for sustainable and diverse communities.

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