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Your situation: You have lost roofing material or suffered roof damage

What you need to do is quickly evaluate the vulnerability of your home to leaks and if you find sources of real or potential leaks do something about it. The following will help you determine if the building is vulnerable to leaks after the wind has blown and if so what you might be able to do about it to reduce water entry.

When you lose weather roofing, the raincoat of your building, you need to evaluate within a very few days the vulnerability/susceptibility of your house to having water leaks so that you can decide what to do and get it done. Some roof coverings can be lost without making the house very vulnerable. For example if you lose shingles or roof tiles only over the eaves, any leaks that occur will likely be outside the living area of the building. Also, if roof tiles are lost but the waterproof underlayment remains intact, you may not experience water leaks.

How to see:

Just because you have or find water in your house does not necessarily mean that it came from your roof or if it came from the roof that it will leak during subsequent rains. The water may have entered not because roofing material has been lost but from some other entry routes. Alternate water entry routes include wind driven water (WDR) through chimneys, flashing, gable end vents, roof vents that got blown off, roof vents still in place, WDR through sidewalls, WDR from inadequate flashing (inadequate because it was not really designed to deal with extremely high winds). Some of these points of entry may not be important unless there is another strong wind event.



When the roof deck is exposed, you are certain to have leaks and will need to cover the area as quickly as possible

(click image for larger version)

It may be obvious that roofing material has been lost. On the other hand it may be hard to see parts of the roof from the ground or you may not be

able to get close enough to a roof area to evaluate the significance of missing roofing. You might try binoculars to get a better look. You might also need to go across the street or way out in the yard to get a good enough view. Again, you will need to use binoculars if you have to get very far away. If you don't have binoculars, maybe a friend or neighbor does. You may also be able to set a ladder against the roof to get a better view. As a last resort, if it is safe for you to do this, you may be able to get up on the roof. Don't go up there if you are not physically up to the task, if it is slippery or wet, or if it is a concrete or clay tile roof.

What to look for on almost any roof:

If you can see black felt paper underneath, it is likely water will slip under it to cause leaks. If you can see plywood, then almost assuredly there will be roof leaks.

The following are some more things to look for and temporary corrective actions you can take until you are able to get a professional licensed roofer.

- *Shingle roofs:* Determine if shingles are lost only over unimportant areas such as eaves, the garage, and overhangs. Also determine what part of shingle is damaged. Is it just the tab or have whole shingles been torn off in an area? If it is just the tab, you may not develop a leak for some time unless the top edge of the shingle below is also exposed. If you can locate some of the tabs in your yard, you may be able to glue them back in place with asphalt roofing cement to help keep the weather roof in place until you can get a roofer.
- *Tile roofs:* Even if roof tiles got blown off over part of your living area your roof probably won't leak much if the roof tiles were secured to the roof with nails or screws that did not get pulled out and the waterproof membrane stayed intact. Missing nails or screws would leave little holes through which rain could enter. Tile roofs can also be held down by concrete or adhesive foam paddies. If this is your case, leaks are less likely unless the waterproof membrane is torn around those paddies.

Don't be misled into thinking your tiles are held down by concrete if you see concrete on or between roof tiles because; frequently, concrete is used this way to make roof tile look nice. If this is the case, it is not essential to holding tiles down (except perhaps on ridges and hips, the upper most tiles). The concrete or adhesive foam that holds down roof tiles is applied between the waterproof membrane and the bottom of tiles.

Experience has shown that the first roof tiles to get blown off are those at the peaks and ridges or those around the outside perimeter of a roof. The good news is that these may not be the most important tiles. This is not to say that damage to them should be thought to be harmless because at the ridge, the roof sheathing is sometimes left open to provide a way to let hot air out the attic. Ordinary rain can certainly fall into these vent spaces. You can check this from the attic

on a bright day by looking to see daylight through the areas where tiles were damaged.

Common problems and solutions:

If nails or screws have pulled out of the roof sheathing that were holding roof tiles or other kinds of roofing you can patch the holes with roofing cement or filling the holes with nails or screws. See the sidebars.

Plugging Small Holes with Roofing Cement: Roofing cement is a black tar like substance that is not water soluble and is used as a weatherproof material paste or sealant. One type of roofing cement can only effectively be used on a surface that is dry; but, another kind can be used whether the roof is dry or wet (check your type). This material is available at home supply stores or at roofing supply places in a variety of packages include 10 oz. caulk tube size, gallon cans, and five gallon buckets. Because only a small amount is needed for each hole a small amount can cover a lot of holes. In the event of a storm there will likely be run on this material so you may want to stock up on a small container of it. It is inexpensive and can be stored a long time. The key to using roofing cement is to be sure that it actually adheres to the roof instead of just being a glob on the surface. It does take some effort to force roofing cement to adhere well enough to provide an effective water seal. This is especially true if the roof surface is rough because of roof granules or gravel. It takes more diligence than you might think until you try it. To be sure it adheres to the roof use an inch wide scraper, putty knife, back of a spoon, or some other smearing tool. Press the cement firmly into the surface multiple times in several directions so that it works in and sticks to the surface. Another option is to buy a small roll of self adhesive patching tape that can be applied over the top of homes or cuts.



Tools and supplies needed for temporary patching of holes or to replacing torn tabs

(click image for larger version)



One example of self adhesive patching tape.

(click image for larger version)

Plugging/capping small holes: If you cannot buy or borrow roofing cement from a neighbor, then you could very temporarily plug the open holes by inserting nails of diameter the same or slightly larger than the nails or screws



originally in place or you could insert screws of the same or larger size in the holes.

If you are apt to run out of nails or screws to fill nail holes be sure to start at the lowest part of the roof that is over areas you don't want water into because there will be more water flowing over the lower part of the roof than higher.

Another obvious way to protect a roof is with tarps or plastic sheeting. This may sound easy; but, in practice it is not. In fact unless you have experience applying tarps or plastic you will likely find that repairs to the tarp or plastic will be needed. This is said to encourage you to do a thoughtful and thorough job of securing them.

Tarps and plastic sheeting (visqueen) can be very effective ways to protect a large part of a roof. However, they have the problems of being difficult to tie down to withstand even ordinary winds and the sun quickly deteriorates them. Wind can tear them rather quickly so be sure to check them regularly. They need to be held down really well because they can act like sails on a sailboat creating a lot of force to pull them off the roof. Be very careful when putting tarps or plastic on the roof because they tend to be very slippery and they hide protrusions on the roof over which you can trip. In addition they hide openings, like skylights, through which you can fall. Installing tarps or plastic sheeting can be very dangerous.



Tarps and plastic can be difficult and dangerous to install - note the boards holding down the edges of the tarps

(click image for larger version)

Roofing felt: Roofing felt is the black paper like material you have seen applied to roofs that is sold in 3' wide rolls. It is designed to be used under weatherproof roof membranes where it is protected from the sun and wind. Sunlight causes it to warp and become brittle. Thus it is not a very effective long term measure for protecting a roof. Even mild winds can tear it. Obviously it is better than nothing and should be considered a fall back to tarps. It is commonly available as a No. 15 and a No. 30. The No. 30 is twice as thick as the No. 15. The best ways to secure felt is with roofing nails that have metal or plastic tabs about 1" square or round under the head of the nail. The big tabs help prevent wind from pulling felt over the



Temporary repairs to reseal the edge of this roof that lost the porch overhang as well as roof cover on the main part of the roof

(click image for larger version)

heads. Another good way to secure felt is a combination of the nails and boards lapped over the felt - similar to the boards shown holding down the tarps.

Hints for applying tarps, sheeting, or felt. Tarps and plastic sheeting material needs to be extended over the ridge of the roof. If there is no damage to the roof cover on the other side, you need to use ropes to tie off the tarp or sheeting to large screw eyelets or some other form of anchorage to the fascia or soffit on that side of the roof. If you have to use

felt paper, it is likely that you will not be able to extend it over the top of the roof. In this case it will be very difficult to seal the upper edge of the felt in a way that you can ensure that water does not get underneath. You can try to create a shingle effect (This means starting at the bottom and applying one layer of felt over the top edge of the one below). Then, try to feed the upper edge of the top felt piece under the intact roofing material above. This may not be easy, but there is not much choice except to try. Even if it is not perfect it may well be better than nothing in keep rain out. One key is to try to ensure that the felt material that is fed under is well secured (and possibly sealed with roofing cement) to minimize leaks and to help it withstand winds that typically come with rain.



The roofing nails on the right have pre-installed plates or "tabs" to help hold the felt paper in place

(click image for larger version)

Locating Leaks Can Be Difficult Because Water Plays Tricks

Leaks from roofs can be tricky to find because where the leak shows up may be quite distant from the source. There are several reasons for this. One is the water may wander sideways across a roof before it goes down the roof. As it goes down the roof it has to find a way to get through the sheathing. Once it gets under the sheathing it may trickle down the bottom side of the sheathing until it finally drops off an edge or it may run down the edge of a rafter or truss member. Then it may travel on drywall ceilings until it finds a place to collect and begin to show up from the inside. Usually the first place one sees evidence of water on a drywalled ceiling is at the crack created when sheets of drywall come together. Another place is at recessed lights or other holes in the drywall ceiling.

Metal roofs:

Experience has shown that new metal roofs properly installed tend to survive high winds quite well. Occasionally corners and ends might get picked up and twisted by wind however they usually stay on roofs. If they become loose from the roof in an area that is important you may be able to deform



them back into position well enough to protect the building. Tarps may be the best way to protect against rain. However, sharp metal corners are apt to cut holes into tarps. A few screws or ropes may be necessary to hold tarps in place and some foam and duct tape may be needed to protect the tarp from sharp edges. Be very careful because metal roofing has sharp edges that can easily cut your hands. The use of leather gloves is recommended.

Older metal roofs may well not be attached as well as new roofs. Real old metal roofs may be very poorly attached or the wood they are attached to may have rotted because of leaks or termites. Consequently, it is particularly important to be careful if you attempt to walk on an older metal roof.

Temporary repairs to holes in metal roofs can be made using metal flashing that is glued down with flashing cement, by one of the self adhesive patching tapes, or by aluminum faced duct tape.

This off-ridge vent broke loose - as a temporary repair, the owner put a tarp over it to minimize additional water leaks

Built up roof, flat or nearly flat roofs:

Flat roofs can be very difficult to protect from rain after the original roof membrane comes off. On the other hand if the damage is localized to cracks or holes, damage to roof top equipment, or the membrane can be laid back in place temporary repairs may be possible.

If the damage is to roof top equipment, either directly to the equipment or to its connection to the roof, it may be possible to put a "tent" over the leak source. The first issue will be to make sure that the tent is well secured so wind does not blow it off or break water seals where it meets the roof. Likely the perimeter of the tent where it meets the roof will have to be sealed to prevent water from getting under the tent unless the equipment was mounted on a curb that raised it above the roof deck. If the hole is in the deck, it will be necessary to seal the edge of the tent to the deck. If you have a gravel roof, it will be even more difficult but not impossible to make a good seal. It will likely take a large quantity of roof cement designed for wet applications that will need to be imbedded well into the gravel to make a water tight seal. A large quantity means perhaps several 5 gallon buckets.

If the edge of the built up roof gets lifted up and peeled back by wind it may be possible to unfolded the damaged part and lay it back in place. This roofing can be very heavy so it may take several people.

With flat roofs it is all too easy to forget where the edges of the roof are and walk off the roof. So be extremely conscious of roof edges.

Some hints about the causes of water coming into a house; if you don't see anything obvious like missing roof coverings - consider these possibilities:

During hurricanes or other strong wind events the wind has the capacity to blow rain into places one might never suspect. As you can see from the sidebar a 100 mph wind can blow rain up 3"; a 130 mph up 5". Actually the

wind blows droplets of water up even higher just like a pot of boiling water does. To compound the problem winds on a roof can be much stronger than winds on the ground and much higher than the weatherman reports because of the additional distance above ground, the geometry of the roof and the effect that neighboring buildings may have in funneling or channeling wind.

How far wind can blow water uphill

80 mph wind will blow water up about 2"	This wind is a low category 1 hurricane
100 mph wind will blow water up about 3"	This wind is a mid category 2 hurricane
115 mph wind will blow water up about 4"	This wind is a mid category 3 hurricane
130 mph wind will blow water up about 5"	This wind is a low category 4 hurricane
145 mph wind will blow water up about 6"	This wind is a high category 4 hurricane
155 mph wind will blow water up about 7"	This wind is a category 5 hurricane

Bear in mind that in strong winds rain gets driven by the wind horizontally. In fact a strong wind can blow rain 10 to 30 feet horizontally under a porch. With this knowledge you should be sensitized to look for water entry sources that you would not ordinarily think of. Probably most of these sources are not of immediate concern/worry immediately after a wind event because unless there is another strong wind from the same direction, water entry may not recur. But you do need to assure yourself that the building is not vulnerable to heavy, but not wind blown, rains.

Here is a checklist of water entry sources other than roofs to consider as possible sources for water in your house.

- Gable end vents and gable end soffits
- Side walls with board or plywood siding.
- A wood frame second floor over a masonry first floor - frequently the flashing does not direct water out of the building at the top of the masonry.
- Ridge vents
- Off ridge vents.
- Goose neck or other vents for things like bathroom vents, dryer vents, range hood vents, and the like.

- Flashing that has gotten wind driven rain blown up underneath it.
- Skylights that typically are designed assuming that gravity will keep water out. We know that strong winds are much stronger than gravity.
- Water getting blown through soffits and then up into the attic. This source should be suspected if water appears on the ceiling at exterior walls on the down side of roofs or at gable ends.
- Leaks around doors and windows

Installing a Wind-Resistive Shingle Roof

Installing a Wind-Resistive Tile Roof

Installing a Wind-Resistive Metal Roof

Installing a Wind-Resistive Membrane or Built-Up Roof

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