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Inspecting today's predominant residential installed roofing material: asphalt composition shingles

I find myself inspecting asphalt composition shingles more often than any other installed roofing material. During the past 25 years as this type of shingle gained in popularity, the most frequently used type changed from a primarily organic (cellulose) reinforced, Class C fire-rated shingle to an inorganic (fiberglass) reinforced, Class A fire-rated shingle. Flexibility is one of the differences between the two. Fiberglass or inorganic shingles are brittle and easily damaged in cold weather. If organic shingles are still used, it's probably because they are more flexible than fiberglass in colder weather. Even though the make-up has changed, the term "asphalt composition" is used to identify both organic and fiberglass shingles.

To inspect roof covering and flashing as required by the ASHI Standards of Practice, a home inspector must be able to identify a properly installed roof system, and be able to recognize one that is not. Often this will require knowing something about an asphalt composition shingled roof. This is true even with a new roof. I routinely find mistakes in newly installed shingles, both on new construction and re-roofed houses. Because of my roofing background, my knowledge of basic asphalt composition shingle installation may exceed the scope of what is needed for a typical home inspection, but I believe home inspectors will find it useful to know what shingle manufacturers recommend and/or what is common practice.

Sheathing

Because the deck performance can have a strong effect on shingle performance, most shingle manufacturers require certain minimum decking standards. The deck must be structurally stable, solid, smooth and secured adequately to rafters or trusses. Sheathing spacing must be maintained to allow for expansion, typically 1/8". The sheathing must be able to hold the nails, resist wind force and meet weight requirements, such as snow loads. Typically, shingle manufactures require the following minimum thickness on sheathings:

- Veneer type plywood 3/8"
- Non-veneer type (OSB) oriented-strand board

7/16"

- Wood boards must be 1" nominal thickness and not more than 6" wide. The 6" restriction is because wide boards (greater than 6") continuously expand and contract as the humidity and moisture conditions change.

Construction in the past frequently used various widths up to
1" x 10" but due to expansion and contraction shingle buckles are common. Boards wider than 6" need to have wider spaces and will move more than the shingles can allow without tearing or buckling. When re-roofing, the contractor should cut the boards that are wider than 6" and re-nail, but this is rarely done.

Some roofers do not understand why the buckles occur or refuse to accept the reason. Occasionally you may see other special types of sheathing installed, but not in my geographical area.

Underlayment

Basically there are two types of shingle underlayment: water-resistant and waterproof. Shingle manufacturers recommend the use of underlayment except on roof-over installations. When a roof-over is being done, installing underlayment between the old and new shingles interferes with the "nesting" or proper placement of new shingles over old, and shingle manufacturers advise against it.

Water-resistant shingle underlayment - Resistant is the key word. It is often referred to as roofing felt, tarpaper or asphalt felt. The most common type is 15# asphalt felt. Less common is the heavier version 30# asphalt felt. There are also special premium felts available that have heavier asphalt with fiberglass re-enforcement, which provides more strength and resistance to wrinkles. The original water-resistant underlayments were used for "drying in the roof," or to keep the deck boards dry until the shingles could be installed. It was also useful as a separation between the asphalt shingles and the pine resin in the boards. Pine resin can cause the asphalt to break down and prematurely fail. Some roofers say the layer also helps conceal the minor imperfections in the decking or the "picture frame look" that you will commonly see on sheathed homes. Although not a major concern, felt underlayment that becomes wet will wrinkle. When severe, it may show through to shingles. Roofing felt paper (tarpaper) is a temporary water deterrent at best. Sun and moisture degrade the material quickly, and then the nails penetrate the material. If the wind blows off a few shingles, it serves as a backup – making the difference between a few drips and a waterfall.

Waterproof shingle underlayment - Commonly referred as "ice and water shield" or by its many brand names, waterproof membranes are made of asphalt and polymers with a fiberglass re-enforcement, which creates rubbery, sticky asphalt. The material seals around nails as they are driven through, which allows it to remain waterproof. Waterproof underlayments were designed to seal the roof and to prevent water from getting inside the building due to ice dams and/or wind driven rain. It is an excellent product for use in critical areas, such as low slopes, eaves, valleys, skylights, or at any flashed area. Unlike the standard felt underlayment, it is unaffected by moisture so it does not wrinkle.

Drip edge flashing

Though not used throughout the United States, drip edge flashing is often installed to prevent wind driven rain from getting under the underlayment and damaging the sheathing along the edges. As with all roofing principles, the upper pieces should always overlap the lower ones. On water-resistant (tarpaper) installation, the underlayment should be under the drip edge flashing along the rake, and over it along the bottom. This prevents the wind driven rain from getting under the underlayment and allows the rain to run off at the bottom. You will see it installed both ways, but under at rake is the correct way per manufacturer's specifications (see *Figure 1*). Keep in mind the purpose of the flashing. On the waterproof type either over or

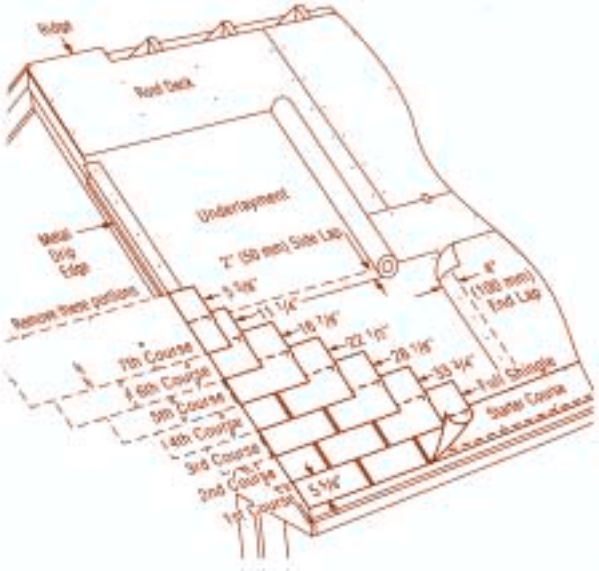

Figure 1

under is acceptable along the rake, but it should still be over at the bottom. The material is sticky, and it seals itself to the flashing, which is why it can go over instead of under when used with waterproof underlayment.

Common mistakes found during an inspection

Misaligned shingles – The mistake I see most often is shingles out of alignment, a sure sign of amateur workmanship. Looking at a 3-tab shingle roof, the cutouts (also known as slots or keyways) should be straight up and down, and the butted joints should be horizontally lined up. Excessive variance on either is a red flag to check carefully for other signs of poor workmanship. But if everything else is correct, a roof with misaligned shingles will probably shed water.

The starter course – The absence of or the incorrect installation of the required starter course shingles is another common mistake, especially on re-roofed houses. A start-er course strip must be installed along the eaves to prevent water from penetrating the sheathing under the cutouts of the bottom course of shingles. Shingle starters are typically standard (3 tab) shingles. They are used routinely on both standard and dimensional type installations.

The most common method of installing starter shingles is a whole shingle positioned with the tabs up – offset 6". Sometimes whole shingles are used with tabs down, still offset 6". Some roofing contractors install starters both ways, stating they've been doing it that way for 25 years and never had a problem.

Most shingles manufactures recommend a different method, (see *Figure 1*). The bottom tabs are always cut off. By cutting off the bottom tabs, the self-sealing adhesive can be placed along the bottom of the overlying first course to help prevent blow off. The use of a whole shingle makes that impossible, and also creates a slight hump under the bottom of the second course that could play a role in damming. By removing the bottom 5" (the tabs), the starter shingle is 7", which is perfect for new installations.

On re-roof (shingle over shingle), the shingles must nest into the old lay of the shingles, (bridging will create an irregular appearance on the finished roof). This requires a 5" starter instead of a 7" one. This is accomplished by cutting off the bottom 5" tabs and cutting off an additional 2" off the top of the shingle. (See *Figure 2*). This allows for the

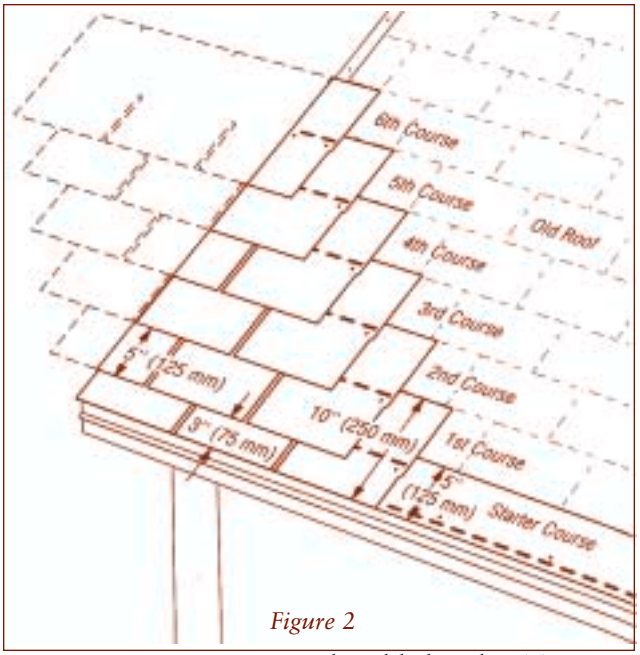

Figure 2

starter course to nest into the old shingles. To prevent the ends from lining up, the starter course must have a 6" offset from the overlay top course.

You won't have much luck trying to convince a roofing contractor with 30 years experience that his starter courses have been wrong, but it's important to note if it does not comply with the manufacturer's specifications. It could have an influence on the limited warranty, but it doesn't void the warranty be-cause shingles warranties are for product defects not installation error.

Overhangs – Inadequate shingle overhang is an indication of amateur workmanship. If there is drip edge flashing installed, the overhang can be less (minimum 1/2"). Without drip edge flashing, the minimum is 3/4". As a general practice, roofers overhang 1" on rake and 1 - 1 1/2" on eaves. Insufficient overhangs typically cause water damage to fascia and rake boards. Excessive overhang is also common. When shingles overhang too much, they are more likely to have wind up lift and to blow off. Also over time, the excessive shingle will curl over to create an unsightly view.

Nailing – Most shingle manufacturers prefer nails to staples. A minimum of four nails or staples per shingle is the usual requirement. Proper nail placement is critical in shingle performance. Incorrect nailing or lack of nails can result in shingle blow off and/or shingles slipping out of place. On vertical (steep) applications or in high wind areas, shingle manufacturers recommend additional nails (six), and the use of small quarter size dabs of roof cement is necessary to seal down shingles. Shingles

will not self-seal on vertical surfaces, which usually ends in blow offs. A small dab of roof cement under the tabs helps hold shingles down. Fasteners should be located directly above the cutouts, at least 1/2" above them. The nail should not be in the self-sealing strip or above it. Roofers commonly ignore that specification and nail in the sealant. On shallow slopes many roofers nail high (above the line). Laminated (dimensional) shingles usually have a nailing line. Sometimes nailing high will cause the laminated part to separate during hot weather and slip down. If you see several laminated shingles that have slipped down, it's probably because the installer nailed too high. Fasteners should not be exposed. The necessary exposures, such as the finish ridge cap or bottom flashing flanges, should be sealed over with sealant. Nails and staples should be flush with shingle. With the wide spread use of pneumatic fasteners, it's common to find over driven, crooked and under driven fasteners. Also the smooth shanks on coil roofing nails have been blamed for back outs or nail pops.

Exposure – The exposure on standard 3-tab shingles is typically 5", and it varies with other types of shingles. On nail-overs (shingle over shingle), the first course will have a 3" exposure, due to the nesting method. Roofers sometimes shorten the exposure on shallow slopes to 4", which is all right on 3-tab shingles except it moves the self sealing strip, and it increases the chance of wind blow off. It is not recommended on the irregular dimensional shingles. The irregular voids it creates increases the chance of wind blow off and wind driven rain backing up under shingles. I routinely see short exposures (sometimes 3") on both dimensional and 3-tab shingles on shallow slopes.

Installation method – Most shingle manufactures recommend installing shingle using the diagonal method (see *Figure 1*). The vertical method (called racking) is also approved, but typically shows patterns on a finished roof, which is more noticeable on dimensional style shingles. Roofing contractors often install 3-tab shingles in the vertical (racking) method. Most dimensional shingles are installed diagonally.

Additional common problems

After the precursory inspection of the new roof, it's time to check for a few more common problems that can be seen by the observant eye.

Check for holes. On steep roofs, roofers will often install a toe board (2x4"nailed through shingles) to hold materials and/or roofers on the roof. After shingles are complete, the board is removed and the nail holes are either forgotten or caulked. I've seen white latex caulk used to fill holes in a black shingle roof. What good is caulk on a 20-year shingle roof? If the shingles were installed during cold weather, they may not seal down until summer. You may want to point that out to your client, because until shingles seal they are more prone to wind damage.

When inspecting older shingles, it can be difficult to distinguish between what is "normal for the age" decline and "premature" decline. Research shows shingles rapidly age during the first years after installation, some granule loss, minor curling around edges and even small blisters may develop, all considered normal. After this initial curing stage, the shingles enter a long, slow aging process that usually last the better part of the shingles' life. During midlife, shingles may lose more granules, but not a noticeable amount, and surface cracking may develop. After the midlife period, the shingles enter a declining stage, during which deterioration accelerates again, ending in failure.

To make informed judgments on the condition of the roof, it helps to understand the violent conditions shingles are exposed to including sun, wind and seasonal weather changes. Think about a hot summer day, when the shingle surface temperature reaches 150 plus degrees, and along comes a thunderstorm. The cool rain quickly drops the material temperature 50-75 degrees. Thermal shock occurs. The shingles and roof sheathing expand and contract like this time after time, year after year. Little by little the shingles tear, and sometimes fail. The shingle must be able to expand and contract along with everything else. When they don't, it's often thought to be a manufacturer's defect, referred to as thermal splitting or tearing. There was an excellent article on thermal splitting in the January 1998, *ASHI Reporter* on "Roof Shingle Failures."

Ventilation – In addition to the harsh environment, there's the issue of ventilation. Research has shown improperly vented attics or air space inhibits air movement and usually increases moisture content. Under these conditions, heat builds up and shortens the shingle life. Moisture builds up, causing sheathing movement and/or deterioration, resulting in shingle failure. This hostile environment is one of many factors that affect the longevity of the shingle. Air Vent, Inc. offers seminars on the topic, which I attended and found useful. The company serves as a valuable information resource, and authored an article published in the September

2001 *ASHI Reporter*.

What happens as shingles age?

As shingles age, the petroleum in the asphalt is drawn up through the shingle, where rain can wash the oils away. The asphalt hardens and the granules begin to break away. Granules serve two basic functions: to give the roof its color and to serve as a sun shield, protecting the shingle from harmful ultraviolet rays. As this process advances, the asphalt has a shrinking effect that often causes the shingle to curl up around the edges. Surface cracking, which is different from thermal splitting, is also common. Surface cracking occurs only on the surface, while thermal splitting is a complete tear through the shingle. Blisters may appear as shingles age. The blisters may be as small as peas or slightly larger – open or closed. I call open blisters "pits." Blisters often are caused by improper attic ventilation, although some roofers believe they are due to a manufacturer's defect. I've seen blisters on three-year-old shingles.

The big picture – When inspecting a roof, I find it wise to first look at the big picture. I step back far enough to get a clear view of the house and its roof. As I slowly walk around the house looking up at the roof, I make mental notes of anything unusual, such as unevenness, sags, dips, or obvious damage. These observations will be worthy of a more focused look later, because dips or irregularities can be prone to leak. Obviously sags or unevenness could be an indication of a structural problem, but that's yet another subject. Inspectors may find it difficult to distinguish between normal aging, prematurely aging and worn out. Many roofs fall in a gray area. A roof may look good from a distance and is without leaks or stains. How do you know the difference between the good the bad and the ugly? Trying to determine the age of the roof is a good place to begin. Check the layers of shingles or attic roof sheathing for empty nail holes, which would indicate a prior roof had been removed. Looking at neighboring homes can often suggest roof age, especially in neighborhoods that were built at the same time. Often it's a guessing game, especially in older homes. Keep in mind there may have been an early replacement due to weather, etc. Shingles carry limited manufacturer warranties from 20-40 years depending on the type and quality of the shingle. It is a mistake to confuse the limited warranties with actual life expectancy. The projected life expectancies vary depending on the type of shingle and the environmental conditions in the area they are located, ranging from 12-20 years on a standard shingle. Typically southern states have shorter projected life spans due to the hot ultra violet light. It is a questionable practice to emphasis shingle warranties with your client. A limited manufacturer's warranty covers only manufacturer defects. If a defect is proven, it typically covers only the cost of the shingles. If the shingle is not defective, the manufacturer has no responsibility. The wind warranty gets tricky and is usually much shorter – usually 5 years.*Continued from last month's issue*

Roof failure factors

Why do some asphalt composite shingled roofs age faster than others, and what problems require attention to forestall failure?

"How long will the roof last?" That can be a tough question when it's being asked about an asphalt composite shingle roof. In the first part of this series, we covered how shingles, sheathing, flashing and other materials should be installed, as well as common installation mistakes. Information about how to evaluate the condition of the shingles and the roof as a whole was included. All useful information, but when it comes to potential roof life, there are important additional factors that need to be considered.

Determining how old a roof is not the best way to estimate how long it will last. There are aging factors to be considered, and the more that are present, the more likely it is the roof will age quickly. There are also problems that need to be addressed to prevent rapid failure.

Basic factors that affect the potential life of a roof

Design - Design complexity plays a role in roof failures. In brief, the more penetrations, valleys, changes in direction or instances of shingles meeting different materials, such as occurs on a built up roof, the more likely there will be premature failures or leaks. You have to shake your head at some roof designs. I often wonder on certain designs if any consideration was given to potential roof drainage problems.

Roof's Pitch - Typically, the steeper a roof is the longer it will last, and the less likely it will leak. In general, water runs off a steep roof quickly, and does not back up during high winds. All things equal, a steep roof will dry faster than its shallow counterpart. All of these factors tend to extend the

life of a steep roof, or even the steep slopes on a house with varied slopes.

The preferred slope for shingles is 4/12 or greater. Most shingles, however, can be installed on slopes as shallow as 2/12 with waterproof underlayment. Occasionally, I've seen a double layer of asphalt felt used (sometimes roof cemented together), or some other single-ply material under shingles on shallow slopes as an attempt to compensate for a shallow slope.

Physical damage

Wind, hail, tree limb and scuff damage is common on asphalt composition shingles.

• The rip of the wind can be a threat to a shingle roof. Proper nailing techniques, the sealant strip and the shingle type all play a role in defending against wind damage.

• Hail damage is often an insurance issue; therefore it should be addressed immediately after damage occurs. Hail damage sometimes appears as little spots lacking most or all of the granules. But, depending on the shingle condition and the severity of the storm, hail can practically destroy a roof.

• Limb damage is something that should have been addressed before it occurred by pruning the branches of trees that pose a threat to the roof. Tree limbs that are too close not only can damage shingles, they also shed debris on the roof – slowing the drying process, which can affect shingle life.

• Scuffs are usually from roof walking on hot days.

Physical damage or the possibility of damage should be reported. Even a small piece of broken shingle can leak!

Sun Exposure - Sometimes there is a marked difference between the deterioration of the shingles on two different sides of the house. It can be because the shingles on one side are older than on the other side; but it can also be because one slope faces south and the other faces north. Typically southern exposures age faster than other exposures due to ultra violet light from the sun. Shingle colors may also influence the extent of this difference, with darker colored shingles aging faster than lighter colors on a southern slope.

Because of the hotter days and more hours of sunlight in the south, I suspect these differences occur more often in southern states than in northern ones. The same factors may also affect roof over shingles.

Roof Over - Most shingle manufacturers do not prohibit shingle roof over; nor does it alone affect the limited warranty. Some experts say it can reduce shingle life as much as one-third. I believe the effect on shingle life is greater in the southern states and when an attic is not properly vented. As home inspectors, it is wise to adjust the remaining life estimate accordingly. Roofers have been known to insist on improving ventilation on re-roofs, such as by adding ridge vents or a fan.

Even though some shingle manufacturers do not prohibit second layers over dimensional shingles, I don't know of any roofers who will install new shingles over irregular dimensional ones.

Problem areas

Almost every roof has at least one plumbing pipe, flashing and a change in plane. Many have skylights. And if there's a problem, it will usually involve one or more of these four elements.

1) Plumbing Pipe Flashing

Also known as plumbing or pipe collars, plumbing flashing is notorious for failures, improper installation and amateur workmanship. When installed correctly, at least one-half the flange is covered with shingles, and the collar should appear similar to the illustration. (See figure 3). There may be slight differences, depending on how the shingles are falling. Some shingle manufacturers recommend using roof cement under metal flanges. In my experience, most roofers do not use it. Using roof cement on plastic plumbing collars is prohibited. Roof cement will cause rubber or plastic to deteriorate, and should not be used on either. There should be no roof cement or caulk around the base of the boot at the shingles. Sealant in this area will often trap water and cause a back up of water under the shingles, and it is a sign of amateur workmanship. Sometimes an exposed flange is caulked to the shingles, but this should not be necessary if it is installed correctly. Its rubber seal can split and leak

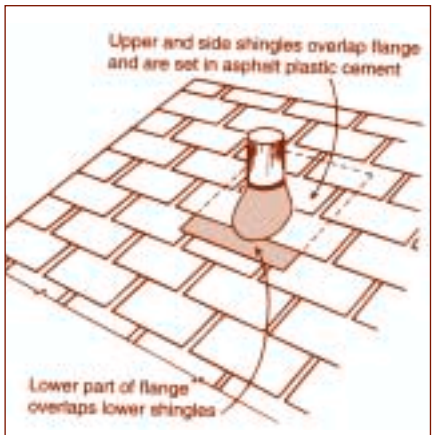

Figure 3

as the flange ages. The flange should be flush with roof - often it has a lift, making it vulnerable to wind-driven rain.

2) Flashing

The roof is most vulnerable to leaks where there is flashing. Almost anyone can nail a shingle, but installing flashing is where you separate novice roofers from the pros. Flashing has to be correct or at least close to correct or it will leak. If the metal flashing is going to be effective, it must be a corrosive-resistant metal and accommodate roof, chimney, wall and structural movements due to settlement, expansion and contraction.

• **Chimney flashing** - Chimneys move and need to have a two-part flashing system - a base (step) flashing and a cap (counter) flashing. The presence of only the step flashing indicates poor workmanship. A good flashing detail will have the step flashing secured to the deck and the counter flashing secured to the chimney (see figure 4). The counter overlaps the step, forming a moveable joint. When movement occurs, the watertight seal remains intact. If there is only step flashing, it will likely pull or split open. Be sure flashing along brick is sealed.

Figure 4

Although step flashing is the most common (and preferred) used on chimneys, you will also see channel flashing. Channel flashing is long lengths of pre-bent metal with a "V" crimp diverter, which is often the cause of a slight lift in the shingles along sidewalls and chimneys.

• **Topside flashing** - is commonly called the backer or header flashing. (See figure 5)

The backer flashing should extend up on the vertical part a minimum of 6" and up under the shingles at least 12". The first course of shingles on the upper side of the chimney should be trimmed back a minimum of 2". The reason the shingles are cut back is to allow proper water drainage and to promote a natural cleaning of debris that would otherwise collect at the top side of the chimney.

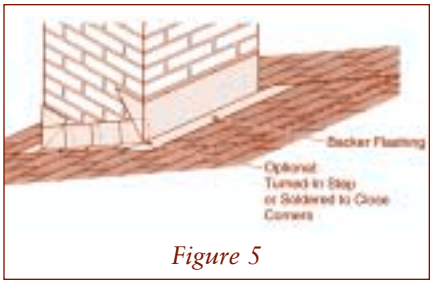

Figure 5

Shingle manufactures recommend the use of crickets (or saddles) on chimneys wider than 24" (some say 30"). Crickets divert the water to prevent ponding and ice and snow build-up behind the chimney, which could cause a backup.

Often old flashing can be re-used (depending on condition) without failure, but it is wise to inspect reused flashing carefully and to warn the customer of the potential for failure. Copper can develop pinholes, but typically outlasts an asphalt shingle roof. The downside is that it may have been reused for several roof installations. Heavy roof cement around flashing indicates previous leaking. A roof cement patch will typically last three to four years. Remember, roof cement is not a substitute for flashing.

• **Loose flashing or cracked/ missing caulk** - Sidewall flashing installed on the outside of siding is a short cut, and it requires close monitoring. Sidewall masonry should have a two part-flashing as described in the section on chimneys. The bottom of the flashing must cover the top of the shingles, even on roof over jobs.

• **Flashing at vertical "front" walls** - (See figure 6) The flashing should be nailed every 12" and be lapped 6", without a nail in the lap to allow for some movement. Although some shingle manufacturers recommend the use of roof cement under the flashing, in my experience most roofers

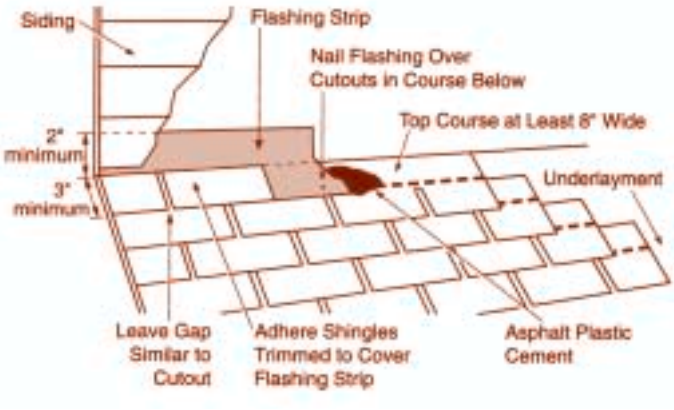

Figure 6

do not do this. Some roofers will cement shingle tabs over the exposed .flash-ing at vertical front walls, but this serves only as a cosmetic feature.

• **Valley flashing** - An area known for poor workmanship. Valleys should be no longer than 10', to avoid buckling with expansion and contraction. Valley flashing lengths should be lapped a minimum of 6", but this is something that is difficult to determine during an inspection. The cut out in the open valley should be 6" wide or 3" on each side of the centerline. Some manufacturers prefer a tapered cut, usually 4" at the top and a taper out at a rate of 1" for every 8', meaning a 16-foot valley can have a 4" opening at the top and an 6" opening on the bottom. A tapered valley may appear unusual, but it is typically less likely to hang up ice and/or leaves, which can cause a dam. A uniform open valley is the most common type. Valley flashing must be "blind nailed" – you should not see any nails. There are also standing seam valleys - the valley has an upstand in the center, which is a premium flashing detail. The purpose of the upstand is to prevent water from running down one slope and running up under the shingles on the other. In my experience most roofers leave valley shingles loose, even though some shingle manufacturers recommend applying roof cement under them. Roof cement in or around valleys indicates previous leaking. Check rusty valleys for holes and recommend paint maintenance.

There is also a potential for leaking if the valley flashing does not overhang the fascia board. Many areas of flashing details are not visible, therefore are beyond the scope of a home inspection. But even when details can not be checked, it helps to know why the leak potential is so high with flashing, and why roof cement can be the wrong solution.

The use of roof cement certainly has its place, but using it in the wrong places can have the reverse effect of what the installer is trying to accomplish. Careless use along valleys, flashing, or plumbing vents can (in some instances) dam and/or trap water, causing water to back up under shingles or flashing, compromising their water shedding abilities. Many roofers never use roof cement on shingle roofs, but others do. Maybe in "Ice Dam Country" it is more frequently used under flashing, than elsewhere. In all climates, exposed roofing cement deteriorates quickly, even though it typically wears well when covered.

3) Changes in planes
Where a roof surface changes plains is a trouble spot. There may be flashing or not, depending on the how extreme the change is and the roofer. Check these areas closely, if possible from the attic to look for stains.

4) Skylights
Often troublesome (even on steep roofs), skylights usually develop problems due to poor (unskilled) installation. Also because of the design it can be difficult to create and maintain a weather tight seal with a low quality skylight. Skylights that appear like bubbles and are flush mounted to the roof should immediately become a red flag due to their notorious reputation for leaking. The ones that sit on a manufactured curb are more reliable, of course depending on whether or not they have the proper flashing installed. Cracks and/or broken glass are also common. Clients often want to know if the skylight can be cleaned. If it's plastic, probably not; maybe glass with some elbow grease. Roofing cement around means it would be wise to check closely for signs of leaking. At a minimum, report the presence of roof cement, warn that it may have leaked, and may leak again.

Red flags

Some of the following problems described here are more serious than others, nevertheless all require equal attention, and all need to be fixed.

• **Raised shingles** - Under-driven nails, backed-up nails and less than adequate return on flashing details are common reasons for shingle lift. Backed-up or under-driven nails are common, but should be corrected because over time the nail may penetrate the shingle and/or wind is more likely to rip off the raised shingle. "V" crimped flashing will also cause a slight rise in shingles. The purpose of crimp is to channel the water, preventing it from getting under the shingles. For the most part, shingles should be flush. Raised shingles are vulnerable to wind damage, and are more likely to allow wind-driven rain to breach the surface.

• **Buckled shingles** - The cause of buckles or wrinkles is sheathing movement, caused by improper space allowances or nailing of sheathing, poor attic ventilation, or structural movement. Regardless of the cause, buckles should be reported with a recommendation to correct.

• **Exposed nails** - Exposed nail heads should be limited to a few at the ridge caps and on overlapping flashing. None should be visible on valley flashing, or between the cutouts on the shingles. Exposed nails in acceptable locations should have a

sealant. Caulk or roofing cement used on nail heads on the open roof surface is considered a temporary fix, but common sense dictates if the shingles are nearing the end of their normal life. I would still report patches with minimum life remaining.

• **The leak** - A roof can look good, but leak. Or, it can look bad, but not leak. Also, roofs can be frustrating because leaks don't always come straight through. Often water will penetrate at one place, run along felt paper until it finds an opening; turn and run along the plywood until it finds another opening. The leak is not necessarily above a stain. What looks like a roof leak can be a gutter or siding issue.

• **Patches** - A patch is not always a problem, but it usually indicates a previous leak or damage. Patches warrant a close look to determine there is a proper tie in with surrounding shingles. If surrounding shingles are old and brittle, a good tie in is hard to accomplish. It's wise to inform clients about patches and to warn them that patches sometimes will fail and leak, especially on older roofs.

• **Cracks** - Cracks completely through the shingle material or through the reinforcement are usually referred to as thermal splitting or tearing. This type of cracking threatens the waterproof integrity of the roof. It is a defect that needs to be addressed. Surface cracking, which does not go through the shingle, is part of the aging process. Severe surface cracking indicates advanced age.

• **Bald spots** - Bald spots are sections of exposed asphalt or scattered, black bare sections with fiberglass mat showing through on a roof that otherwise looks to be in good shape. Washing the roof with a pressure washer, which removes the granules, is one cause of bald spots. Depending on age, the spots can indicate the roof is at the end of its useful life. Whatever the cause, bald spots are a problem, and should be reported.

• **Blisters** - According to shingle manufacturers, small blisters are part of the normal aging process that is often accelerated by lack of proper ventilation. Other authorities say blisters are the result of manufacturers' defects in the material. Either way, I believe blisters shorten shingle life. When you see blisters, check attic ventilation. I would also inform a client of the possibility of premature failure. Open blisters, with asphalt exposed, are most definitely an indication of minimum life remaining.

• **Holes** - Watch for small holes. I often find unexplained holes. Probable causes: bullets, arrows, falling limbs, Christmas light installation.

Worn out - It usually easy to identify a worn out shingle, sometimes from your vehicle! Crumbling, cracked up, cupping, clawing, excessive loss of granules are all signs of advanced deterioration. Also the cutouts often widen as the shingle ages, because the shingle is drying out and shrinking.

Always look closely at the shingle under the cutout. The aging process may be accelerated in this area because there is only one layer and it is often a darker color. Deterioration under the cutouts is a sure sign of advanced deterioration, and this area is often the first to begin leaking.

Know when to say, "I don't know"

As professional "ASHI" home inspectors, we need to be as observant and knowledgeable as possible about potential roof failures, as well as about what causes them. Some roofs we inspect will fall in a gray area. In these cases, it's wise to err on the side of caution. Much of a shingle roof is concealed, including flashing, underlayment, and fasteners. When problems are suspected but not confirmed, it's wise to advise the customer to call in a qualified roofer to recommend corrections.

When inspecting shingle installation, keep in mind roofers vary their techniques, and do not always follow manufacturers' installation recommendations. Does that mean there is a defect or a problem? Not necessarily! Look for leaking, and use common sense. Remember to document the methods of inspection and to note any limitations per ASHI standards. ■

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John Cranor is the owner of Homebuyers Inspections Inc., Glen Allen, Virg. He serves on ASHI's Technical Advisory Committee.