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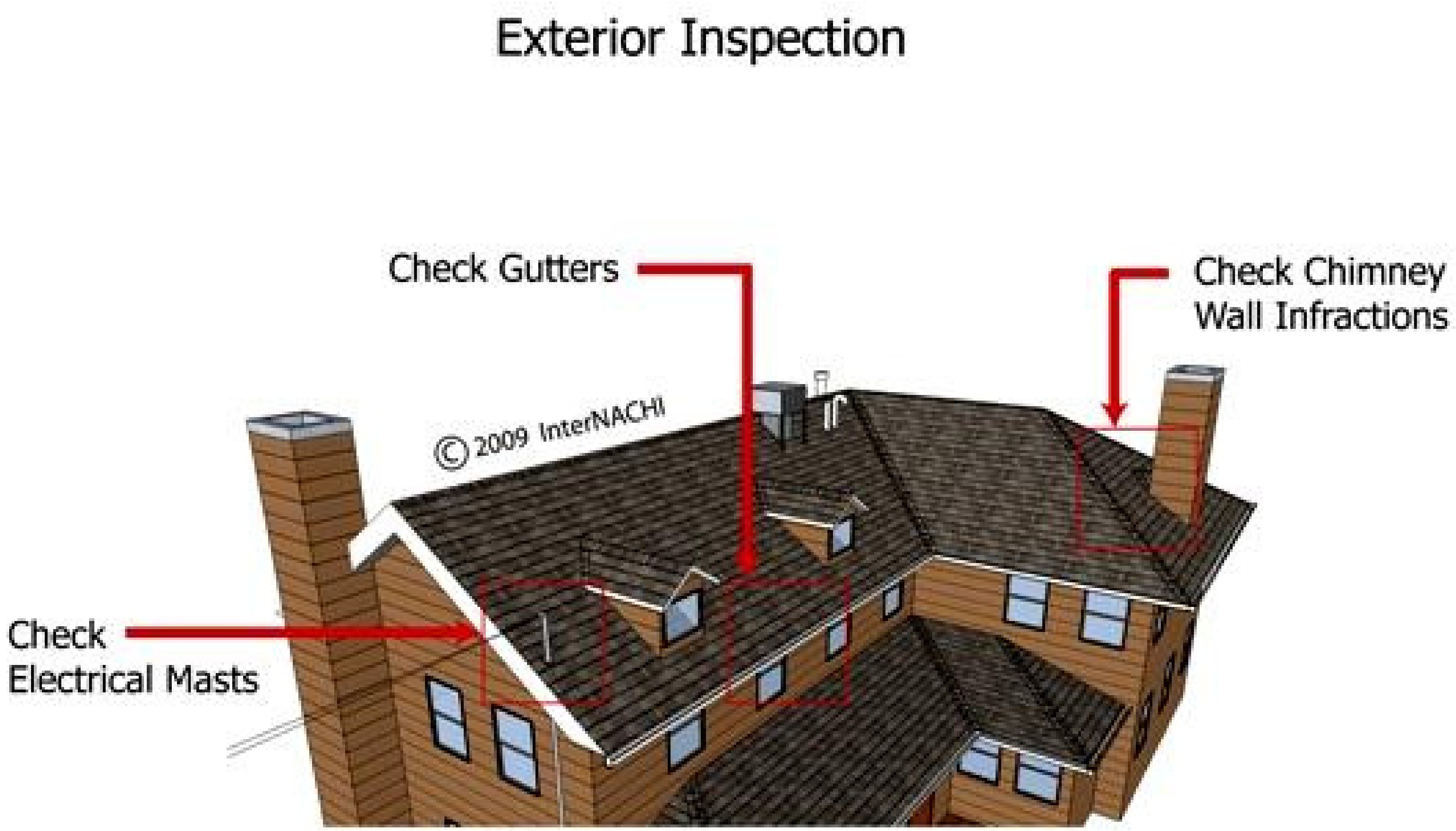
INTRODUCTION

The roof inspection is both one of the most crucial areas of home inspection and one of the biggest concerns on the prospective home buyer's mind. Spending a large portion of the inspection appointment dealing with the roof and following some basic rules will pay dividends to the inspector, both in terms of customer satisfaction and also in reduced liability.

Before approaching a roof inspection, it's important to keep safety at the forefront. Too many home inspectors and other tradesmen have been seriously injured by being lax with ladder and roof safety.

One of the first safety issues to consider is that some roof systems simply should not be walked on. In particular, most types of solid tile roofs and all wooden shingle and shake roofs can be accidentally damaged by the inspector. In addition, all types of roofs should not be walked on if conditions are wet or icy, or if the roof is mossy (covered in algae), or just too steep.



Even when considering walking a dry roof or a roof of low pitch that's just one floor up, it's important to keep safety in mind. When all other conditions appear favorable and safe, it's still possible to put your foot right through the asphalt shingle roof covering of a house due to rotten roof sheathing.

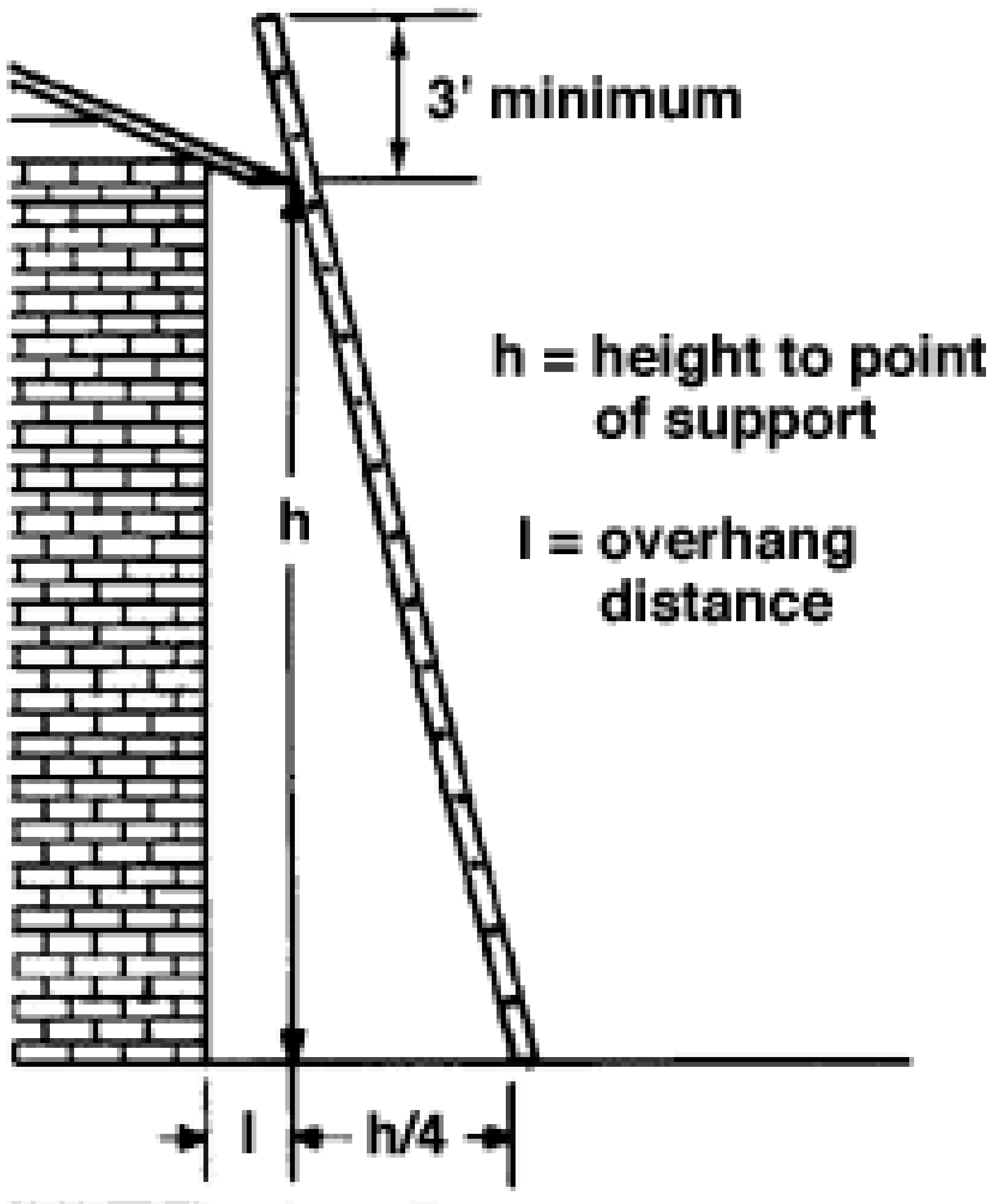
Remember that, most of the time, a roof covering can be inspected from a ladder at the eaves, from the ground with binoculars, or from overlooking windows.

When planning to walk the roof covering, remember to wear soft-soled sneakers or similar footwear, as they offer a far superior grip compared to work boots, unless those boots are specially designed for walking roofs.

Safety

When inspecting the roof using a ladder, keep the following in mind:

- Purchase ladders that are rated for your weight.
- Ensure that the ladder is properly leveled on solid ground.
- Make sure that the ladder is at the correct angle to the wall. Pay attention to what the ladder is leaning against, as it is easy to mark siding or damage guttering if you're not careful.
- Consider buying electricians' ladders and steps, as these are made of non-conductive fiberglass and will protect you from shocks, should you hit any un-insulated electrical components, such as service conductors.



Ladder Setup Tip

1. Lean the ladder against the building.

2. Look at the ladder's feet and draw an imaginary line between them. Put your toes up to that line.

3. Stand up straight and hold your arms straight out in front of you. The ladder rung should be just beyond your reach.

4. If you can touch the rung, the ladder is too steep. Move it back and repeat these steps.

5. If the rung is several inches beyond your fingertips, the ladder pitch is too shallow. This is also hazardous because the feet can slip backwards when you are on it, causing you to fall. Move the ladder closer and repeat the procedure.

This is a simple process that takes five seconds and ensures that you are about to climb a ladder that is properly pitched.

Do Not Do's

Inspect a wet roof

Approach Power lines

Climb on roof with out proper gear

Continue if you don't feel safe.

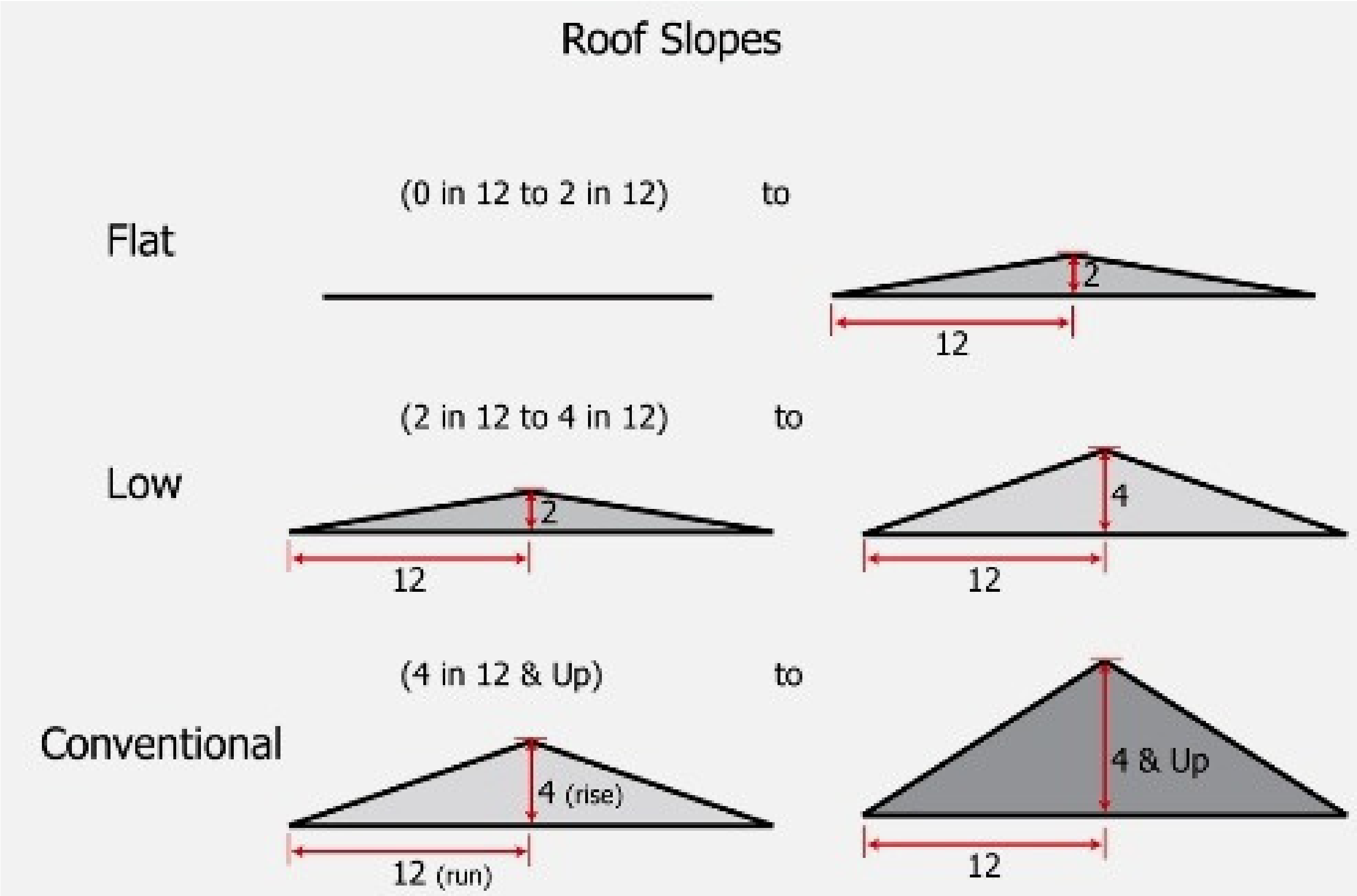
Risk your safety

NEVER WALK BACKWARDS!!!

THE BASICS

Roof coverings are usually quoted for installation "by the square." A building square is an area of 100 square feet, or 10 feet by 10 feet—this is the finished area.

Roof coverings are also measured by their weight per square. This is an important consideration when a professional or structural engineer is evaluating whether an existing roof structure is capable of carrying the extra load of multiple layers of roof coverings. Generally, a roof with more than two layers of covering is likely to be overloaded and, therefore, many jurisdictions limit the number of layers of covering.



Measuring Slope

The angle of the roof above the horizontal is referred to as the slope of the roof, which is expressed as **rise over run** – that is, the number of feet of vertical rise over a horizontal run of 12 feet – which may also be expressed in inches of rise per 12 inches (or 1 foot) of run.

For example, a roof that has a rise of 4 feet over a run of 12 feet has a slope of 4/12 (expressed as a 4&12 sloped roof). A roof with a rise of 12 feet over a 12-foot run has a 12/12 slope, also expressed as a 12&12 sloped roof. This is a 45-degree incline on the roof.

Roof Pitch

Roof pitch is different than slope. Whereas roof slope is expressed as rise over run, pitch is expressed as a fraction based on a roof having a slope of 24&12, which is considered a **full- pitch roof**. So, a roof with a slope of 12/12 (or 12&12) is a 1/2-pitch roof. A 4/12 sloped roof would be expressed as a 1/6-pitch, since 4 feet is one-sixth of the full pitch of 24.

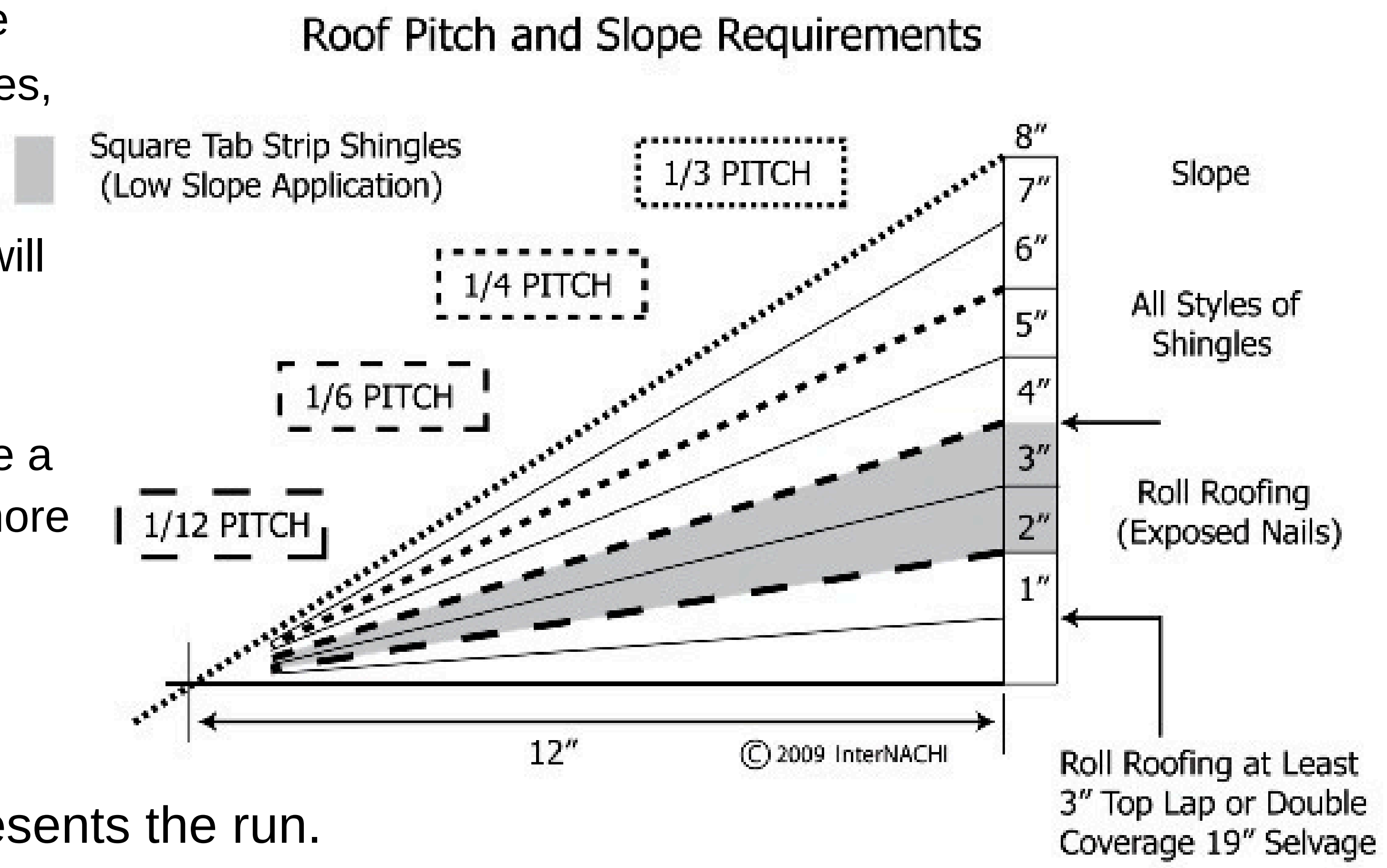
Types of Roofs Based on Pitch:

- A roof with a pitch lower than 2 /12 (or 2 feet of rise in 12 feet of run) is classified as a flat roof.
- A roof with a pitch between 2 /12 and 4 /12 is called a low-rise or low-slope roof.
- A roof with a pitch of over 4 /12 is considered a conventional roof.
- Any roof with a pitch of more than 8 / 12 is too steep to walk on.

Inspectors will occasionally see some very odd roof pitches, such as a 6½ :12, but these tend to be on older stick-built construction. Most contractors try to avoid these odd pitches, as it makes cutting rafters and other roof framing timbers very difficult.

Generally, the steeper the roof, the better it can shed moisture, and the longer the roof will last.

Asphalt shingles should not be used on a roof lower than a 3 /12, and wood shakes and shingles normally require a pitch of greater than 4 /12. Very low-pitch or flat roofs require a continuous surface, such as roll, built-up or membrane roofing. This will be covered in more detail in the section on types of roof coverings.



In the diagram above, note that the horizontal figure is 12 inches. This represents the run. The numbers listed to the right, from 1 inch to 8 inches, represents the rise. As the chart shows, a 2&12 roof slope is equal to a 1/12-pitch; a 4&12 roof slope equals a 1/6-pitch; a 6&12 slope equals a 1/4-pitch; and an 8&12 slope equals a 1/3-pitch roof.

Slope vs. Pitch

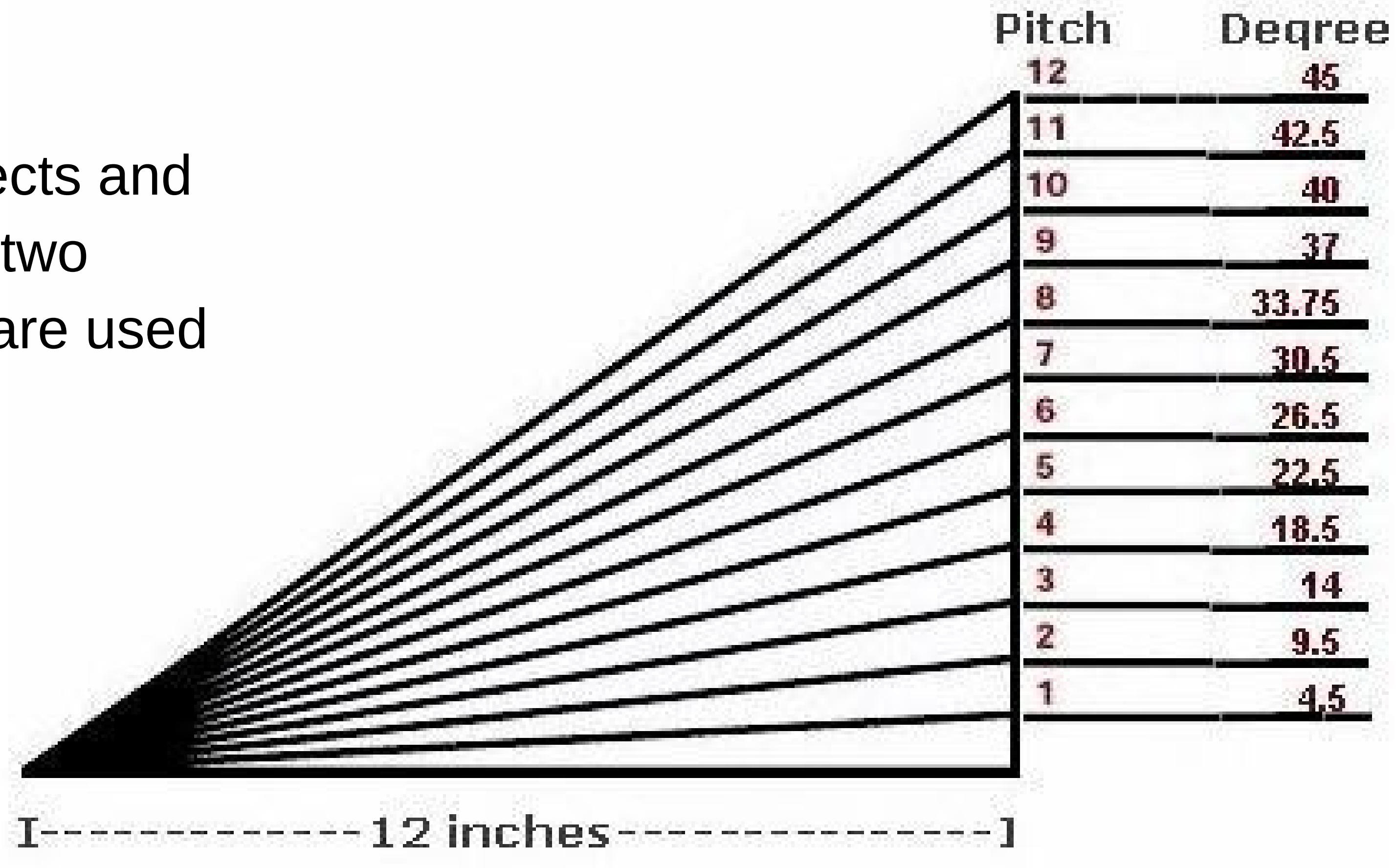
There are problems with these two systems:

Most roofers are unaware of the difference between roof slope and roof pitch and use the terms interchangeably, when they really are referring to a roof's slope. Roof pitch is difficult to express when the slope dips below 1 inch per foot. Although they are both expressed differently (4&12 slope vs. 1/6-pitch), they are often and easily confused, since both are written in shorthand as a fraction.

Other comparisons of slope and pitch are as follows:

SLOPE	PITCH
½ /12	1/48
1/12	1/24
2/12	1/12
3/12	1/8 1/6
4/12	1/4 1/3
6/12	5/12
8/12	1/2
10/12	7/12
12/12	2/3 3/4
14/12	5/6
16/12	11/12 1
18/12	
20/12	
22/12	
24/12	

In practice, most roofers are concerned with slope (rise over run), while architects and carpenters tend to deal with pitch. It is useful for inspectors to be aware of the two different systems in order not to be confused by them, even though the terms are used interchangeably by many.



Use this app to find your pitch.

ROOFING STYLES AND DETAILS

When reporting on the roof or other systems, it is important to use the proper terminology and include accurate locations.

Inspectors should get into the habit of using standard locating verbiage, for example:

"left side of hip roof when viewed from front," or, better still: "west-facing plane of gable roof." Adopting this vocabulary makes the inspection report more understandable and reduces the number of call-backs from clients seeking further explanations.

Roof Styles:

A **gable roof** has two covered planes with a center ridge. The planes may or may not be of the same pitch, as with the "saltbox" style of home.

A **gambrel roof** is similar to a standard gable roof, but each of the covered sides has two planes.

A **hip roof** has four planes and meets either at a point or (more typically) a short ridge beam.

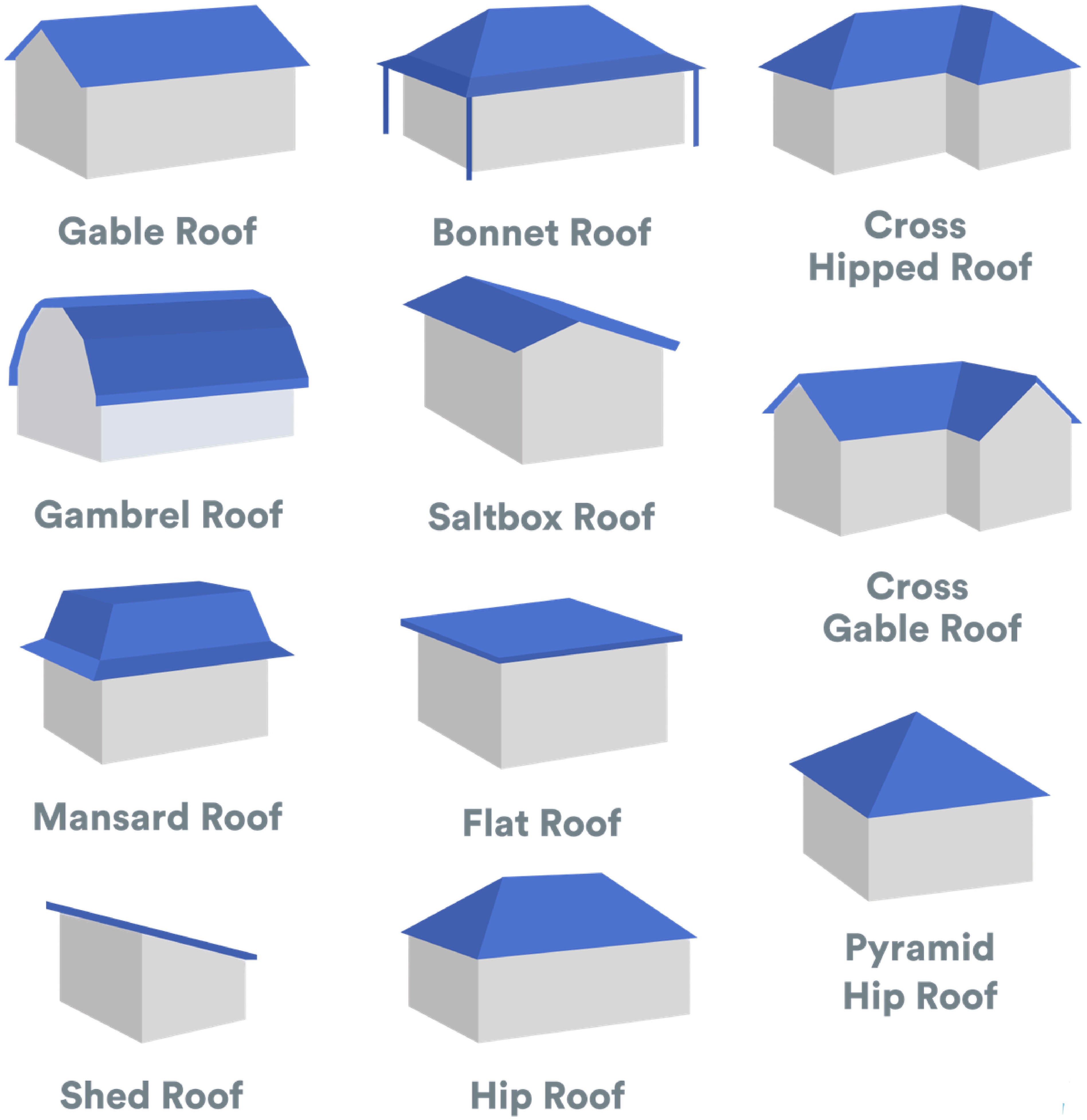
A **shed roof** has a single plane, and is the roof most commonly used for additions to existing structures.

A **mansard roof** has four pitched planes with steep sides, and either a flat or lower-pitched, upper-most surface.

A **flat roof** should not be fully flat but pitched down in one or more areas for adequate drainage.

A **butterfly roof** has two planes angled down to the center.

Common Roof Styles:



Weather

We have all seen pictures on the news of homes in "Tornado Alley" -- the geographic region that lies between the Rocky Mountains and the Appalachian Mountains -- with their roofs blown off, but it is not unusual to see weather damage in all areas of the United States, as well as in various regions around the world. Sometimes, severe weather damage will leave behind ripped shingles and dislodged tiles affecting just one or two areas of a home's roof but, occasionally, there can be more widespread damage that is easier to spot.

All roof coverings, regardless of materials, are susceptible to additional variables, such as:

weather;
impact damage;
environmental conditions;
orientation;
ventilation;
insulation;
structural issues; and
installation defects.

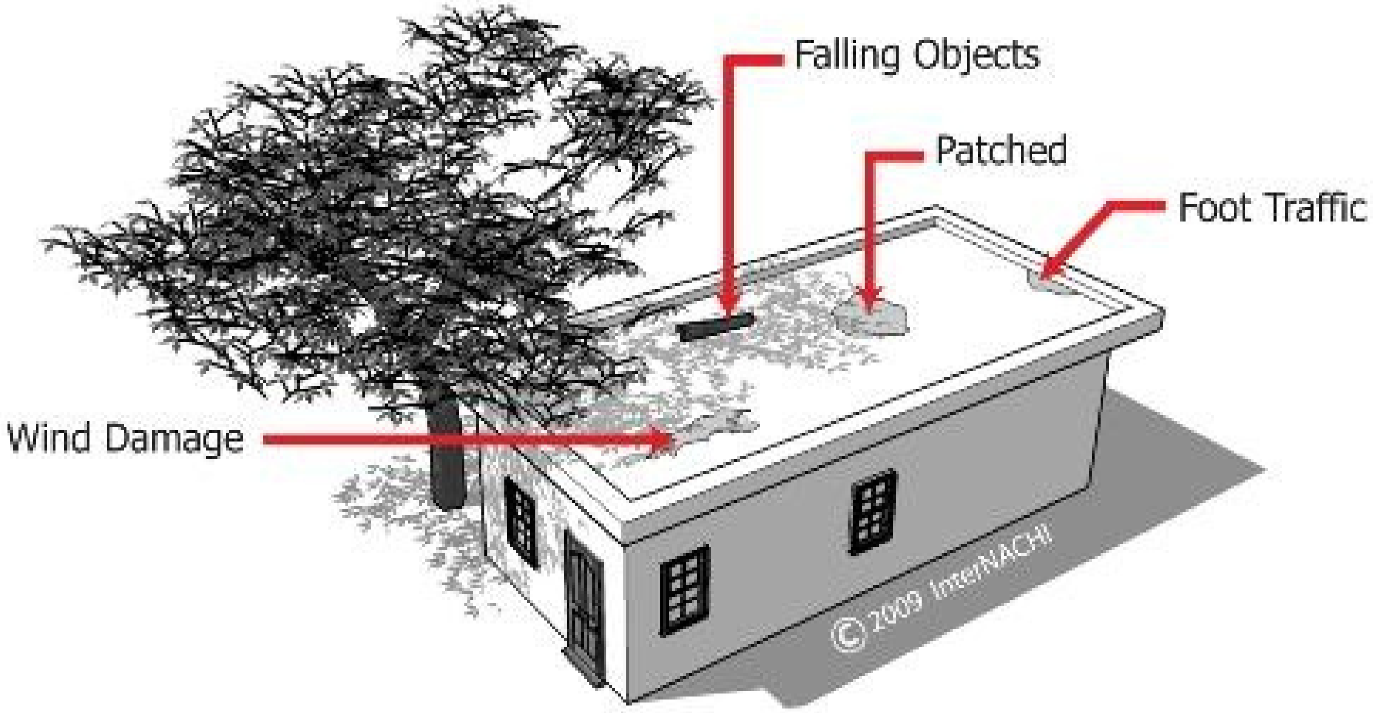
Impact Damage

This is very common and most often caused by overhanging tree branches. It can also be inflicted by falling masonry, and cracked tiles and shingles from people being on the roof.

Environmental Conditions

This category of rapid deterioration of the roof covering can be attributed to airborne pollutants that are prevalent in industrial areas, as well as from the acidity of pine needles breaking down on the roof's surface.

Flat Roof Defects



Above: a fiberglass asphalt shingle roof whose shingles became brittle over time, allowing the wind to get under them and blow them off the roof

Orientation

The direction that the roof faces can have a significant influence on the long-term condition of the roof. For example, south-facing roof planes tend to show signs of overheating, particularly those with asphalt shingles. North-facing roofs and those in the shade tend to have more algae- and moss-induced problems, both of which will shorten the life of the roof covering.

Above: an asphalt shingle roof that shows evidence of overheating, probably caused by both orientation and poor ventilation

Ventilation

Poorly vented roofs, especially those over cathedral ceilings which are hard to ventilate, will show signs of overheating, and may also show signs of moisture damage.

Insulation

Inadequately insulated attics will also promote rapid failure of the roof covering due to issues such as ice damming in colder climates.

Structural Issues

Both the roof sheathing and framing can sometimes indicate structural issues revealed on the roof's surface. Such problems may be as apparent as cracked shingles or tiles above a structural defect. More commonly, there will be a wavy look to the roof caused by thin roof sheathing that is over-spanned.

Above: impact damage on a clay tile roof showing broken and dislodged tiles

Installation Defects

All roofing systems are only as good as the installer, and it is not uncommon to see all types failing due to poor fastenings or other installation problems.

Sheathing Issues

Originally, roof sheathing was made from 3/4-inch to 1-inch planking, but in the 1950s and '60s, it became common to use plywood or particleboard in 8x4 feet sheets laid perpendicular to the roof rafters. It is not uncommon for the roof to have a wavy appearance. This is most often caused by:

- rafters or trusses set too far apart;
- roof sheathing that's too thin;
- moisture-damaged sheathing;
- sheathing that’s fitted too closely together;
- and/or sheathing that's missing H-clips.

At left: visible dips due to de-laminating ply sheathing

(Photo courtesy of Richard Moore)

Rafter Issues

Similar to ridge sag, rafters may also be pushed down in the center. Wherever possible, try to get a view along the plane of the roof. There can be many reasons for the rafters bowing.

Here is a list of possibilities:

- undersized rafters;
- roof loads too high;
- a lack of collar ties;
- a lack of purlins or knee walls;
- poorly modified ceiling joists; and/or
- improperly modified roof trusses.

At right: Notice the ridgeline changing angle at the right side above the door, which was caused by a cracked ridge beam.

(Photo courtesy of Dave Valley)

General Structural Inspection

When inspecting the roof structure from the exterior, the inspector should also pay close attention to the wall structures. If the roof system shows signs of any of the problems listed previously, then you may also observe possible signs of the walls bowing out, or the soffits pulling away from the tops of the walls. This is a condition called rafter spread, where the weight of the roof, which is under compression, has pushed the roof rafters outward, resulting in a separation of the roof structure from the walls, and pushing the top of the walls outward.

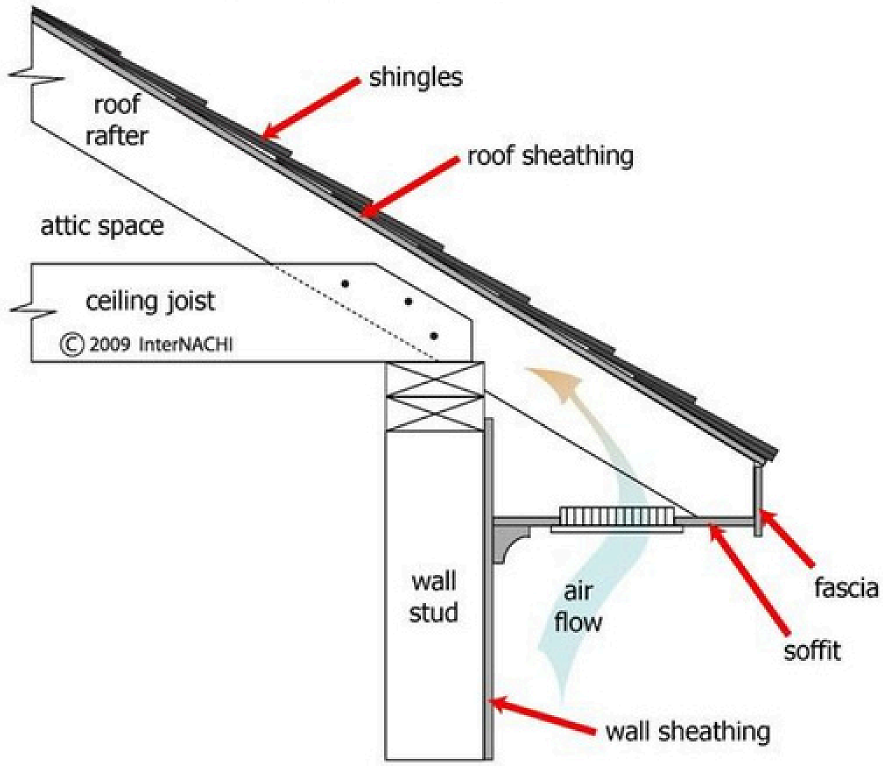
This wall (at left) was actually being pushed over after a fire had collapsed the roof. Visible at the top is rotation of the wall structure.

ROOFING TRIM

Any wooden trim associated with the roof system is susceptible to rot and, in some cases, insect damage. It is an area that should be fully inspected either from the ground or from a ladder, if possible.

Remember that ladder safety is a priority. Be careful when inspecting roofing trim. Also, be careful if you are allergic to insect bites and stings. Soffits, gables and fascia boards can literally be a "hive of activity."

Soffits and Fascia



Fascia

The horizontal board enclosing the ends of the rafter projections (or tails) is referred to as the fascia board, and if gutters are attached, they are fitted here. Because the fasciae are at the lowest point of the roof plane, they often act as sponges for any misdirected moisture. Rotting fasciae can also be masking a lot of rot in the rafter tails, which can be very expensive to replace.

Rake or Barge Boards

These are the boards that cover the ends of the roof structure from the fascia to the ridge. Like the fascia boards themselves, they are known to rot, especially at the lower ends.

Soffits

The soffit is the area underneath the eaves or rafter tails that is normally enclosed at the front by the fascia boards. There are three main types of soffit:

- open soffits, with no bottom enclosure;
- closed soffits, where the soffit board is fastened directly to the underside of the rafter tails; and
- box soffits, where the soffit board extends at a right angle from the wall to the end of the rafter tail.

As with the fascia boards, the soffit, placed at the low point of the roof structure, is a typical area for rot. Common causes include water penetrating the roof covering and migrating down the sheathing, ventilation problems, and ice damming. Carefully inspect these items, and report any damp or rotten-looking areas.

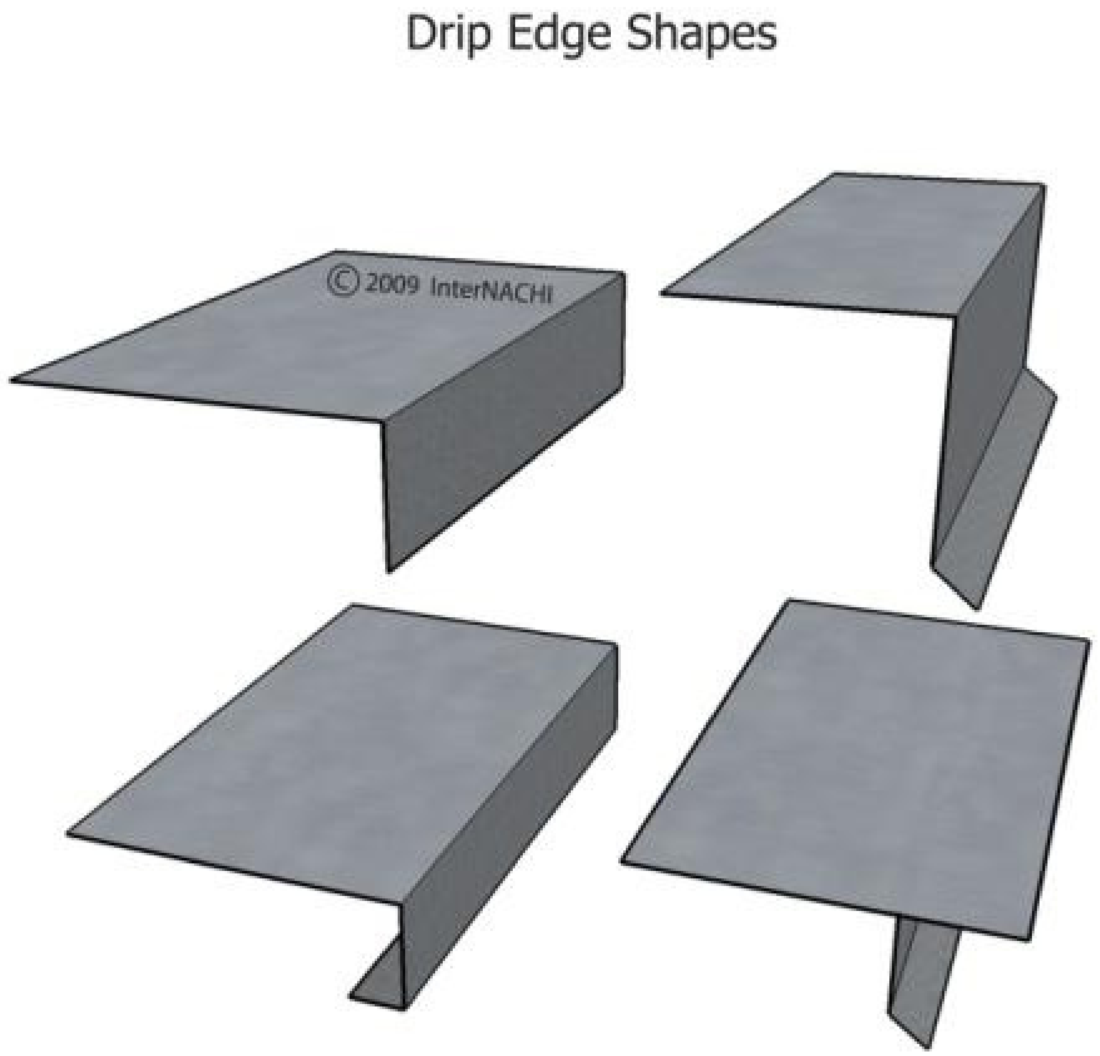
At left: standard box soffit showing signs of de-lamination due to moisture intrusion (Courtesy of Mike Rose)

At left: older-style enclosed soffit clearly showing holes and missing boards, as well as signs of moisture in the roof sheathing

Drip Edges

Many of the problems with wooden roofing trim systems can be avoided when a proper drip edge is fitted between the roof decking and the roof covering. This edge protects both the sheathing and the trim by directing water either into the guttering (if fitted), or at least far enough away from the trim that it cannot wick into the wood.

Drip edges should be installed so that the roofing paper or felt is underneath the drip edge on the rake, but over it along the eaves.



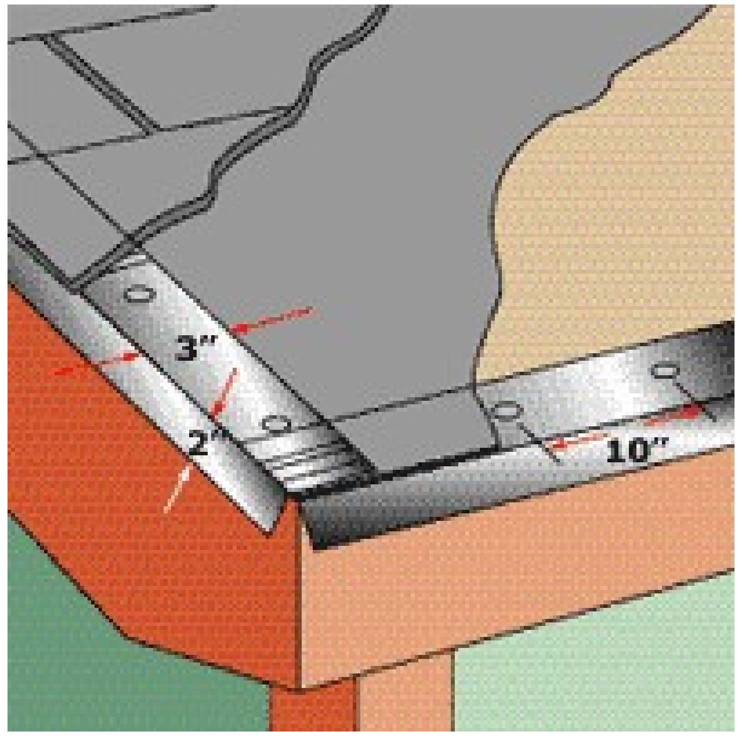
At left: rot in the lower part of the rake board; the wood has swollen and is pulling away.

(Photo courtesy of Erby Crofutt)

At right: open soffit with visible signs of moisture staining on the underside of the roof sheathing

At left: a good example of how a drip edge is designed to direct water away from the fascia

At right: details of roof drip edge showing proper application and nailing pattern



Other Trim Areas and Issues

Any additional decorative trim installed either onto the fascia or at the soffit wall interface is normally referred to as a cornice. These can be as simple as a 1/4-inch round molding, or a larger profile, sometimes including dentil molding. All such trims should be thoroughly inspected for rot and insect damage.

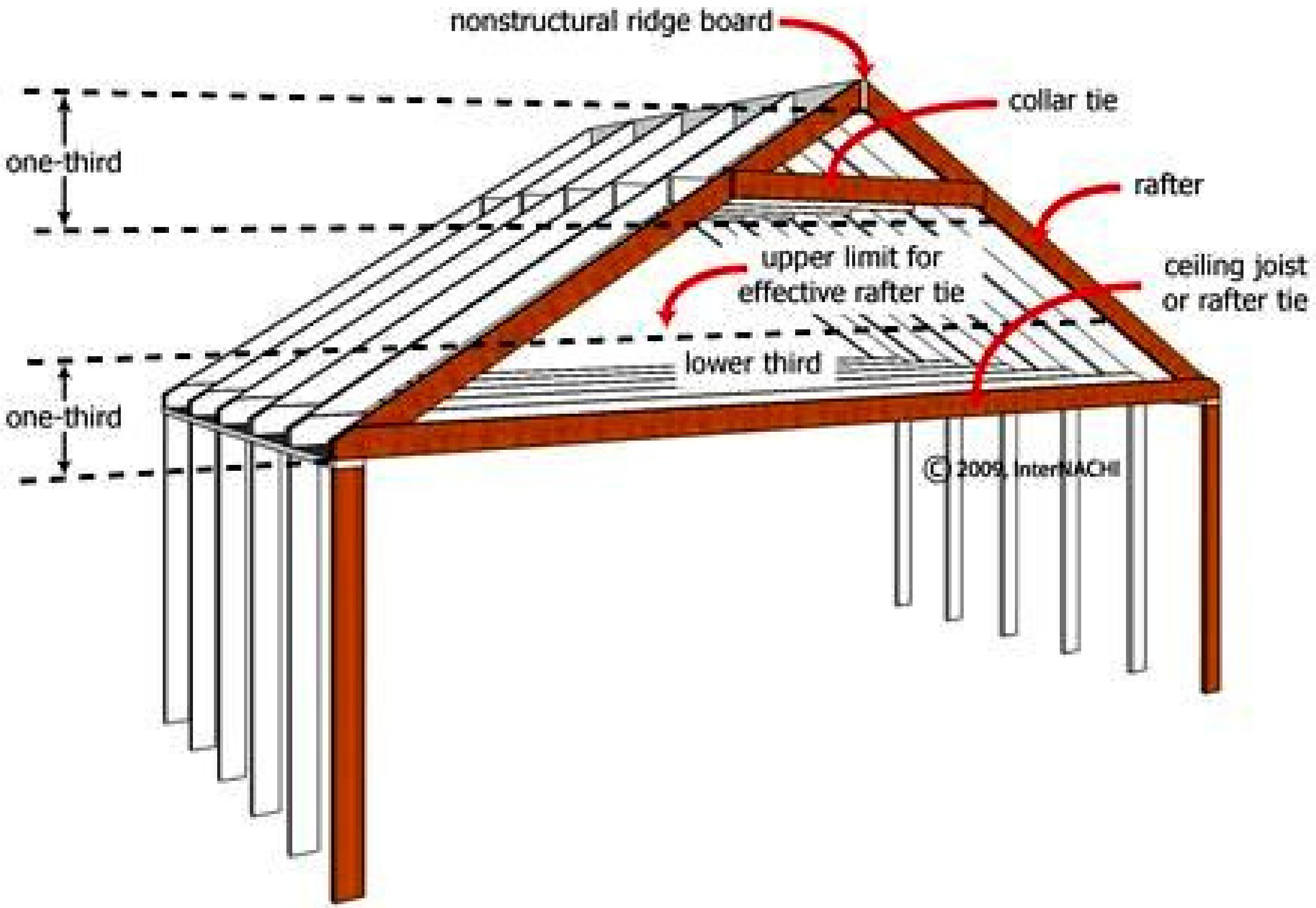
All other wooden trim adjacent to the roof surface should have at least an inch of clearance from the roof covering (and more in snowfall areas). This is particularly important with areas such as the sides of dormers, where water running down the roof can damage the trim and siding.

At left: Wood rot has loosened the cornice molding and is splitting around the nails.

At right: an ornate cornice under a mansard roof with dentil molding

Structural Issues Disguised as Cosmetic Ones

At left: Any trim that is this close to a roof's surface could potentially allow moisture to wick into the structure.



Although diagnosing the causes behind structural and cosmetic defects lies beyond the scope of a home inspector's duties, according to the InterNACHI Residential Standards of Practice, understanding some of those causes can help inspectors recognize certain defects more quickly so that he can report them and make appropriate recommendations to his clients.

One of those defects related to roofs is rafter sag or a bowed interior ceiling that is mistakenly attributed to a lack of collar ties.

Collar ties are designed to resist expansive or an outward movement of force that is usually accompanied by wall spread and ridge sagging. However, they do not prevent rafters from sagging or bowing downward in the middle. That's caused by factors such as over-spanned, under-sized or over-spaced rafters.

Such conditions are also sometimes caused by excessive roof load, such as too many layers of shingles or other roofing-covering material, or a change-out from composition shingles to tile, where the weight is greater than 6 pounds per square foot. Collar ties help prevent roof settlement but not a rafter from sagging in the middle.

(It is possible that when the slope of the roof descends to a lower slope/pitch, the load on the rafters' span shifts somewhat from the seat cut toward the middle of the rafter.)
In the case of rafter sagging, the collar ties themselves become bowed or bent inward, since they are not designed to resist a compressive load. Collar ties resist the outward or expansive motion of the rafters, not compression.

It is the framing members that are designed to withstand both compressive and expansive loads. A lack of collar ties (typically 1x wood) would cause the ridge -- not the rafters -- to sag, as well as cause the walls to spread. They react by simply bowing as they resist the force of expansive or outward movement.

One of the most common mistakes that homeowners and contractors make in remodeling is that they remove the ceiling plaster and joists (to raise the ceiling and gain room volume, etc.), and thereby also remove the ceiling diaphragm, which is a supportive element and can be an integral seismic element of a building. This not only affects the roof framing and wall spread, but it removes a seismic resistive plane of the structure (the ceiling), regardless that lath and plaster or drywall doesn't have much shear value.

What generally happens is that, after removing the ceiling, homeowners and contractors sometimes fail to do one of two things:

1. install the appropriate number and size of collar ties that are typically no more than one-third up toward the ridge plate from the wall plates, so as to prevent ridge sag and wall spread; or

2. remove the ridge plate and install a ridge beam in its place, with the load effectively transferred to the foundation. A ridge plate allows rafters to rest against it but does not carry a vertical load. The triangle formed by the rafters and ceiling transfers the load to the walls of the house. (Contrariwise, the ridge beam transfers the vertical load of the rafters and roof system directly to the foundation, where it is concentrated. Sometimes, an additional footing is required under that portion of the foundation to support the additional load presented.)

Another issue is that a homeowner or contractor may add drywall to the underside of the rafters, thereby increasing the load on them and causing ventilation problems, which can, in turn, cause condensation and moisture problems, resulting in mold growth, rafter rot, etc.

An inspector who observes a sagging rafter in an unfinished attic, a sagging or bowed ceiling, or, through infrared imaging, detects heat signatures that may indicate moisture above the ceiling, should note such details in his report and recommend further investigation by a qualified professional who can make any necessary repairs and/or structural corrections.

ROOF COVERINGS

One of the big problems with inspecting roofs is that there are so many different roofing systems out there, and the inspector is required to know a lot about all of them. While they may appear to have little in common, the basic rules for the inspector remain the same:

- Identify the roof covering material.
- Report on any visible deficiencies.
- Recommend repairs and/or maintenance as needed.
- Don't report on the future life expectancy of the covering.

The different types of roof covering materials reviewed in this section -- along with their history, lifespan, installation methods, and inspection and reporting issues -- include:

- **asphalt shingle;**
- **tile roofing,** including:
    - slate roofs;
    - clay tile roofs;
    - concrete tile roofs; and
    - asbestos cement tile.
- **wooden shingle and shake** (and their differences);
- **roll roofing;**
- **built-up roofing;**
- **membrane roofing;**
- **metal roofing systems,** including:
    - standing seam systems; and
    - metal oddities (shingle, sheet, corrugated).

ASPHALT SHINGLES

Asphalt Shingle Inspection

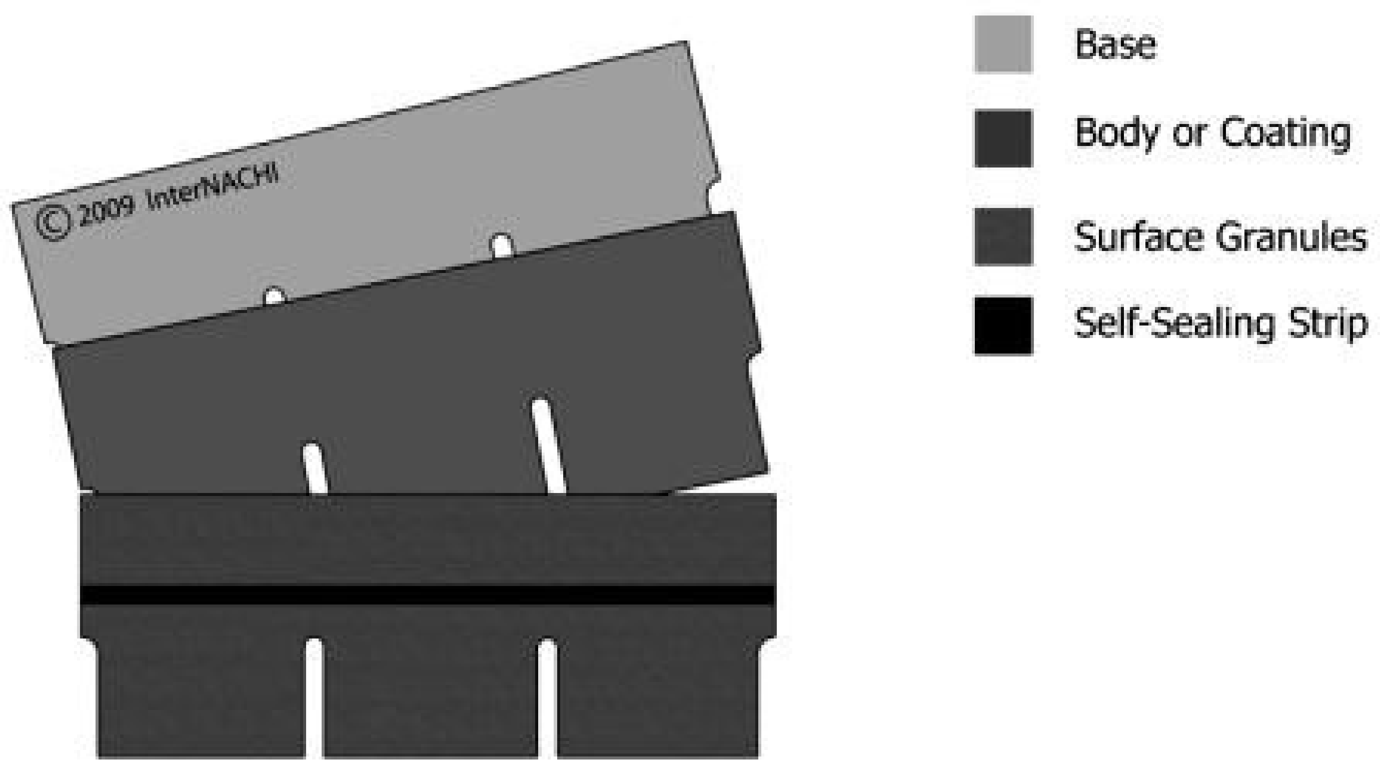
Asphalt shingles are the most common roof covering that the inspector will see, as they are relatively inexpensive, easy to install, and last between 15 to 40 years, depending on type.

Despite the fact that there are many different styles of asphalt shingles, they are all manufactured and installed in the same way, so they tend to exhibit similar problems over their service life.

Basic Shingle Construction

The quality of asphalt shingles is in direct proportion to their weight per square (100 square feet). Heavier shingles (up to 350 pounds per square) generally last longer than the lighter shingles (200 pounds per square). The heavier shingles tend to be of the architectural style, with several layers of material.

An inspector needs to be aware that most jurisdictions allow only two layers of shingles to be applied to the roof due to the load considerations. For example, a 15-square area of roof with two layers of average 250-pound shingle has a total weight of covering of 7,500 pounds, or nearly 4 tons of weight.



All these shingles are made from an asphalt-impregnated mat, either of a cellulose material (for regular shingles) or fiberglass (for fiberglass shingles). The mat is then covered with a heavier layer of asphalt. Finally, a layer of granules is pressed into the surface as protection from ultraviolet light.

Asphalt Shingle Installation

The underlayment for asphalt shingle is usually roofing felt with a course of ice and water shield covering the lowest 3 feet. This prevents moisture from backing up under the shingle over the eaves.

The application starts at the bottom of the roof with a single starter course (often, a shingle with the tabs cut off) fixed so that the first proper course is glued at the lowest edge.

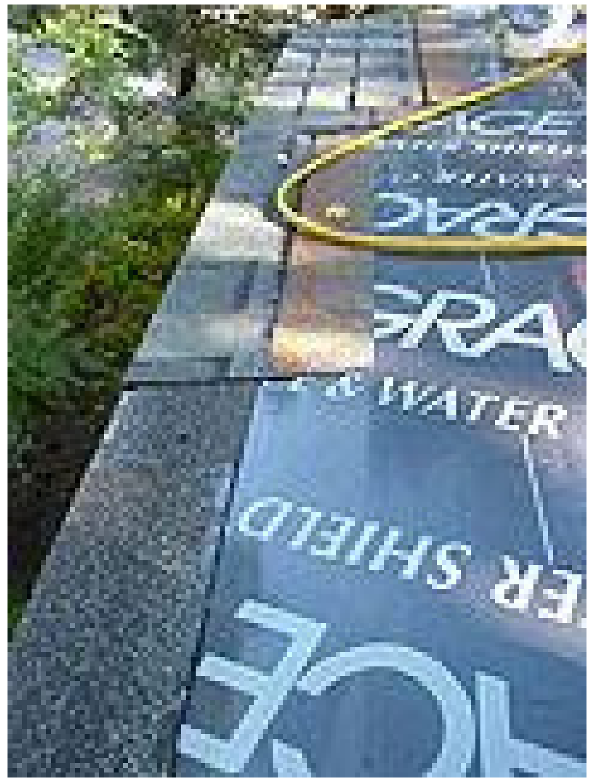
This is followed by the regular courses applied so that the joints or gaps between the tabs do not line up with each other, and over three courses to stop water from penetrating the covering. Each shingle has a tar line above the exposed surface which glues the upper shingle to the previous course.

Ridges are capped with either a special tile manufactured for the purpose (as in the case of architectural styles) or, more commonly, trimmed-down shingles prepared on-site by the installer from standard 3-tab shingles.

Asphalt shingles are designed to be installed on roofs with a pitch greater than 4 /12, but some shingles can be installed on roofs as low as 2/12 where proper precautions, such as double underlayment, have been installed, and the shingles themselves have been additionally glued down in accordance with the manufacturer's instructions.

The lowest 3 feet of the roof get a layer of ice and water shield.

A starter course is applied to the roof edge which protects the roof from any gaps in the first full course.



Then, a roofing felt is applied, overlapping at the bottom edges.

At left: After the starter course comes the first full exposed course.

At right: The second course is applied, ensuring that there is a proper side-lap so the joints don't line up.

Asphalt Shingle Designs

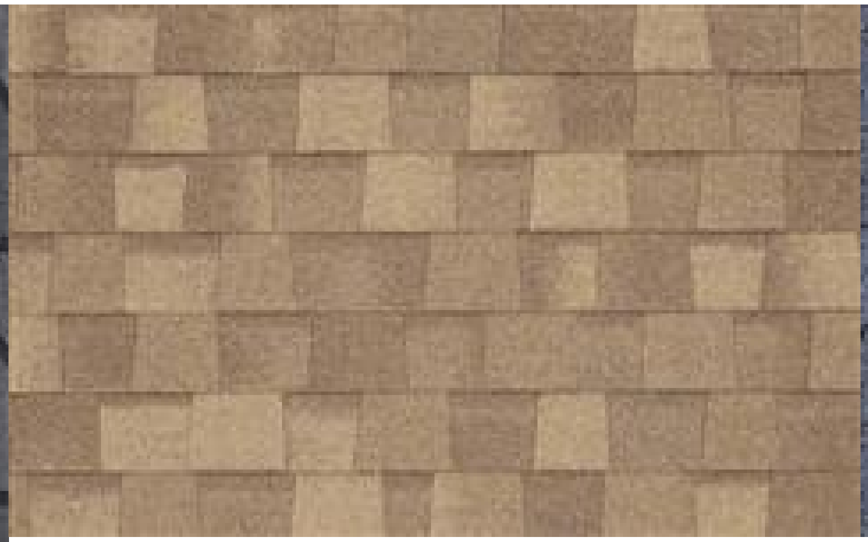
There are many designs and colors of asphalt shingle available.

The basic designs are:

- standard shingle with no decorative features;
- 3-tab shingles, which somewhat ape roof tile; and
- architectural shingles that have added layers of material to mimic the
- look of slate or shake roofs.

The joints are staggered all the way up the roof.

Here, you can see the side-lap between overlapping shingles.


PROBLEMS WITH ASPHALT SHINGLES

All asphalt shingle roofs, regardless of design, will fail due to the following reasons:

- weather issues;
- impact damage;
- debris on the roof;
- poor installation techniques;
- material failures; and
- ventilation problems.

Weather Issues

- **Sunlight** is a big enemy of asphalt roofs. When subjected to the sun's heat, the shingles will dry out due to off-gassing of hydrocarbons in the asphalt, since asphalt is a petrochemical product. This will promote the loss of granules and make the shingle more brittle. As the shingle dries out, it will also shrink, opening up the areas between shingles or between tabs. This may also cause cupping, bowing and small surface fractures or fissures in the shingle.
- **Rainfall** will wash away the granules over time, causing the tile to degrade. Traces of aggregate in the gutter signify potential problems.
- **Wind** can get under the exposed tabs on the shingle and cause them to be ripped from the roof.
- **Hailstones** can easily damage the roof covering, causing small depressions in the
- shingles, and potentially breaking off weak shingles.

At left: a roof with visible hail damage

At right: Wind has blown off ridge shingles and damaged others.

Above: Shingles overheated by the sun and/or poor ventilation are curling and cracking.

Above: an extreme close-up of a badly weathered fiberglass-based shingle whose fibers are exposed

Impact Damage

- **Trees** cause the most impact damage by their branches being too close to the roof covering and tree limbs falling onto the roof structure.
- **Walking** on the roof can, in some cases, cause damage to the covering, especially if it is already in brittle condition.
- **Masonry** falling on the roof will often damage tiles. It is not uncommon to see damaged shingles directly below the chimney.
- **Moss** is a big problem on badly drained and shady roofs because it retains moisture and its root system will get under the roof shingles. It's fair to say that you will not generally see moss on a good roof, as the roots need to be constantly moist.
- **Leaves** and pine needles on the roof will also promote fast decay of the covering because they retain moisture on the roof. Also, many species produce acids during the decay process, and these can eat into the asphalt.
- **Airborne** pollutants are often found in industrial areas. Acid rain will quickly erode a roof covering.

At left: another example of shingles that have been overheated by the sun and are now curling and cracking

At left: A chimney has collapsed, damaging the shingles.

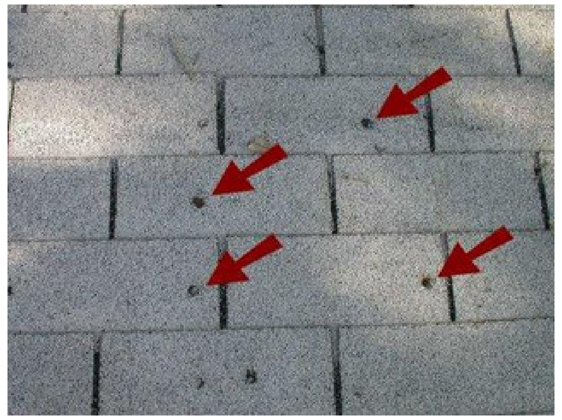
At right: A mossy roof is trapping moisture on the structure.

Poor Shingle Installation

Here are some of the issues that often occur due to poor installation:

- **repairs** that were improperly carried out;
- **shingles on a low-pitch roof** where the use of shingles was not intended;
- **joints that were not overlapped**, allowing water to drain right onto the sheathing; and
- **improper nailing** that was not done to the manufacturer's specifications, where either the nails are too short, causing nail pops, or not enough nails were used. Every 3-tab shingle should have four fasteners (or six in high-wind areas).

Above: Improper repairs have been made to this shingled roof.



Above: Nail pops indicate where the fasteners have backed out of the roof.

Material Failures

Inspectors will occasionally see failure due to manufacturing defects, such as blistering from within the shingle, or premature cracking of the shingles, particularly with fiberglass-based shingles. One particular brand of shingle was the subject of a class-action lawsuit against Bird Fiberglass Shingles of New Hampshire, which was settled in 2001.

This kind of damage is typically seen on fiberglass-based shingle roofs.

(Courtesy of Inspect-NY)

Ventilation Problems

Many problems with asphalt shingle roofs are caused by poor ventilation of the roof space, which leads to overheating of the roof coverings. This is more apparent when the roof has multiple coverings which can trap additional heat. It is very common to see shingles that are less than 10 years old but are in very bad shape due to overheating caused by poor ventilation, or overheating caused by the presence of too many layers of shingles.

Reporting Requirements

The inspector must report on the following when inspecting asphalt shingle roof coverings:

- shingle type;
- missing shingles;
- damaged shingles;
- number of layers of covering;
- signs of previous repairs;
- shingles that are cupping or buckling;
- moss or vegetation growth on the shingles;
- granular erosion;
- shrinkage of shingles;
- lack of a drip edge;
- nail pops; and
- shingles that have been incorrectly installed.

SLATE TILE ROOFING

The different varieties of solid tile roofs are basically all inspected in the same way and tend to exhibit similar problems that the inspector needs to report on.

In this section, we'll look at most of the solid tile types: slate, clay, concrete, and asbestos-cement. We will also look at their installation, common problems and reportable issues. Remember: Solid tile roofs should not be walked on. They should be inspected either from the eaves using a ladder, or from the ground using binoculars.

Slate Roofs

Slate is a sedimentary rock (which means that it has settled into layers) that is easy to split into tiles. Most slate tiles used in residential construction are 3/16-inch to 1/2-inch thick, but some older tiles are much thicker.

Slate roofs are roughly five times the weight of standard shingle roofs; therefore, the roof framing has to be designed to carry a much greater load than normal. Roofs that have been retrofitted with slate should have been re-engineered to carry this additional load.

Slate has been around as a roof covering in Europe for more than a thousand years. Many churches, castles and manor houses were originally built with this type of roof covering. In many cases, the same tiles are still *in situ* (in the original position), although they have probably been refitted many times over the centuries due to leaks or failure of their connectors.

American slate differs in quality, depending on where it was mined. For example:

- Pennsylvania slate is somewhat soft and lasts less than 100 years.
- Vermont slate is denser and lasts well over 100 years.
- Virginia slate is very hard and can last more than 200 years.

The poorest-quality slate can be recognized by ribboning in the color, where a band of a lighter stone can be seen running through the slate. These slates tend to break along this band due to differential weaknesses. Where such slate has been used, the ribboning should not be visible on the exposed face of the tile.

Other rules-of-thumb for slate roof installation:

- Slate roofs should not be installed where the roof pitch is less than a 4/12.
- Slate can be applied over battens, plank or sheet sheathing.
- Slate tiles are generally fastened with two copper nails each.
- Joints between tiles should be staggered by 3 inches per course or row.

In every second row, the joints can line up vertically. There should be a minimum of 2 inches of headlap clearance. That is the point where there are three layers of tile, and there can be as much as 4 inches, depending on the pitch of the roof.

SLATE SHINGLE HEADLAP	
Roof Slope (Pitch)	**Minimum Headlap**
between 4:12 and 8:12	4 inches
between 8:12 and 20:12	3 inches
over 20:12	2 inches

The most common problem with slate roofs occurs with the fasteners rather than with the tiles themselves. Slate nails should be of copper rather than ferrous metal (iron), as copper will not rust over time and cause the tiles to start slipping.

When inspecting a slate roof, inspectors should report on the following:

- missing tiles;
- broken tiles (though some corner chipping is expected and acceptable);
- tiles that are slipping out of place; and
- signs of previous repairs.

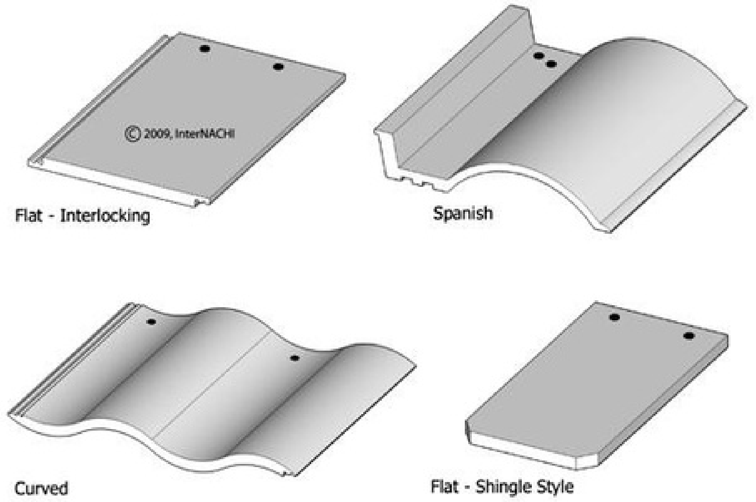
At left: an older slate installation showing many broken and dislodged tiles

At right: a new slate roof; notice the crisp edges on the slate.

At left: an older roof; small chips at the corners of tiles are generally not of concern. Note the ridge cap, which is made of clay tile.

CLAY AND CONCRETE TILES

Concrete and clay tile roofs are very similar from an inspection perspective, as they are all installed in the same way and tend to exhibit the same problems in service.



They are both made in similar sizes and shapes, such as flat, curved or corrugated, and may or may not be of an interlocking design. In most cases, tile designs are produced to be installed as ridge caps and used in other specialized locations.

Both clay and concrete tiles have a long lifespan. Problems other than those from mechanical damage tend to be from failure of the underlayment and flashings, rather than failure of the tiles themselves. In many cases, when the roof needs repair, the original tiles are taken up and stored while the substrate is replaced. The tiles are then re-installed, with the addition of new tiles to replace the damaged ones.

Remember that tiles can be up to five times heavier than asphalt shingles; therefore, the roof system needs to be much heavier to support the additional load.

Clay Tiles

Regardless of style differences, all clay tiles are made from terracotta, the same material that common houseplant pots are made of, and they are damaged just as easily.

Terracotta tiles are produced in molds or extruded from clay with high silicon content which, when fired, changes composition and becomes impervious to water. Clay tiles may also be glazed to add color and a high-gloss finish.

When discussing clay tiles, we tend to think of the Spanish or barrel style of tile, but there are many variations in style, from the corrugated look, to flat and fully interlocking designs.

These are samples of traditional clay tiles, also known as Spanish or barrel-roof tiles.

At left: a flat clay tile roof

At right: a glazed clay tile roof

Concrete Tiles

Concrete tiles are also available in a wide range of designs and finishes. Many of them are designed to look like other materials, such as slate, clay, and even cedar shakes and shingles.

The process of manufacturing concrete tiles is similar to that of manufacturing clay tiles, except concrete tiles don't need to be fired in a kiln. A chemical process converts the concrete from a liquid slurry into a rigid tile.

Some concrete roofing tiles require painting to extend their lifespan. This maintenance should be performed roughly every five years, depending on the local climate.

Above left: These look like traditional Spanish-style clay tiles, but they're actually concrete tiles.
Above center: Another concrete design
Above right: Although it looks like slate, this roof is actually made of concrete tile.

Installation

Both clay and concrete roof tiles are installed in the same manner. They are installed over traditional planking, sheathing, or on some older installations.

Most concrete and clay tile systems rely on their underlayment for complete weather protection, and the lower the pitch of the roof, the more robust that underlayment needs to be. As a general rule:

- a roof pitch lower than 4:12 should have a double underlayment or be applied over a built-up roofing system; and
- a roof pitch lower than 2½:12 should not have tile installed at all.

Some fully interlocking designs of tiles do not require an underlayment, as they are considered to be totally impervious when installed and flashed correctly.

Many designs of both concrete and clay tile roofs require the installation of blocks to correctly position the individual tiles. In the case of traditional Spanish or barrel tiles, these are installed vertically up the roof surface. In other cases, they are required to run horizontally across the roof plane.

All tile roofs should be installed with a minimum of one corrosion-resistant fastener per tile, if the tile weighs less than 9 pounds per square foot. Heavier tiles and those installed in snow-load areas require a minimum of two fasteners.

All open ends of shaped tiles at both the eaves and at any valleys should be sealed to prevent birds and other wildlife from entering the area between the tiles and the underlayment.

Inspection

As previously stated, tile roofs should not be walked on, as they can be very easily damaged by foot traffic. From a ladder at the eaves or from the ground, the inspector should pay particular attention to the following potential issues:

- broken or missing tiles;
- tiles that have moved out of position;
- signs of previous repairs;
- signs of moisture evacuating the roof from under the tiles;
- missing, damaged or rusting flashings; and
- missing or deficient bird and pest barriers.

The inspector should always report on the following:

- the method used to inspect the roof;
- the material and style of the roof covering;
- missing, damaged or slipped tiles;
- missing or damaged flashings and bird stops;
- any signs of moisture penetrating the roof covering; and
- any required re-painting, where applicable.

ASBESTOS CEMENT TILES

Asbestos-fiber cement tiles were a very common roof covering from the 1930s up to the early 1960s. In fact, many homes of that period had both asbestos cement roofs and wall coverings.

The main problem with asbestos tiles is that they are relatively thin and become very brittle over time. This makes them susceptible to mechanical damage, such as tree limbs falling onto the roof and fracturing or breaking the tiles.

These roofs can be particularly costly to repair since it is extremely difficult to find replacement tiles. If the roof covering needs to be removed and replaced, the debris has to be disposed of under U.S. EPA guidelines.

Again, the inspector should never attempt to walk on an asbestos cement tile roof.

The inspector should evaluate the roof system just like any other roof covering material, paying particular attention to:

- missing or broken tiles;
- tiles that have been moved out of position;
- signs of previous repairs; and
- missing or damaged flashings.

Above: diamond-pattern asbestos cement shingles

Above: side-lapped asbestos cement shingles

The inspector should always report on the following:

- the method used to inspect the roof;
- the material and style of the roof covering;
- missing, damaged and slipped tiles;
- signs of previous repairs (tiles siliconed back in place is common); and
- missing and damaged flashings.

DAY

2

Above: This is a standard rubber membrane roof on a commercial property.

METAL ROOFING

Metal Roofs: Sheet and Tiles

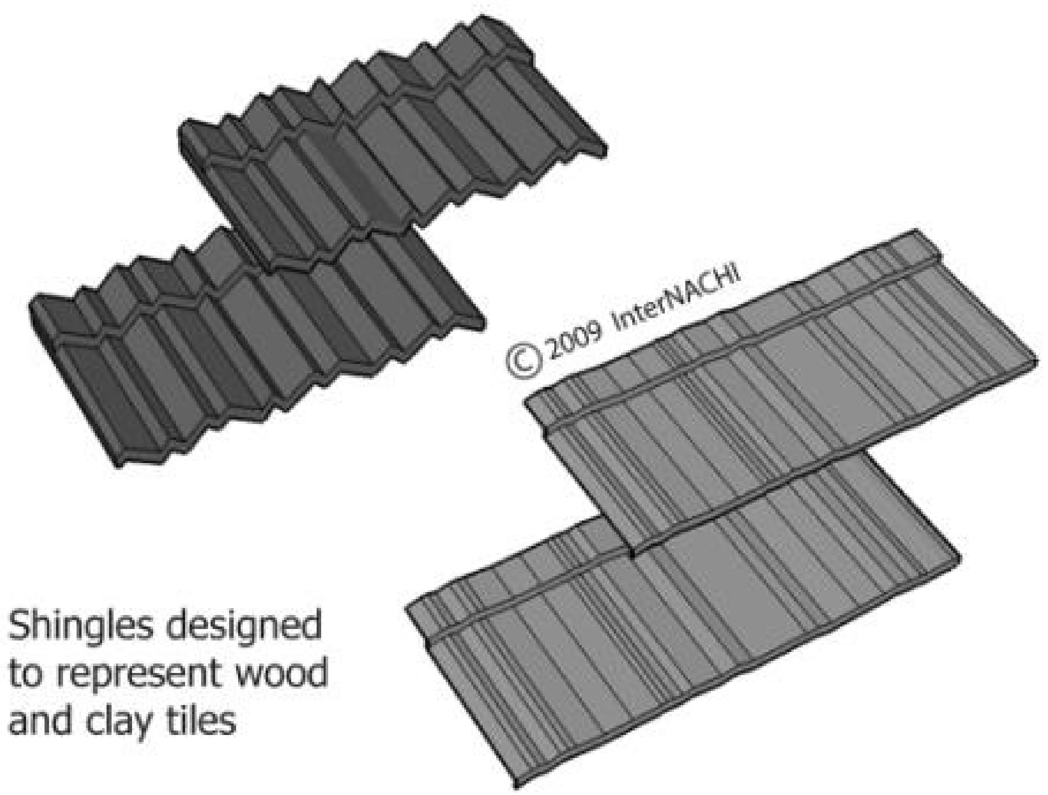
Until fairly recently, it appeared that metal roofs had gone out of style. In the U.S., they have been associated with run-down rural properties.

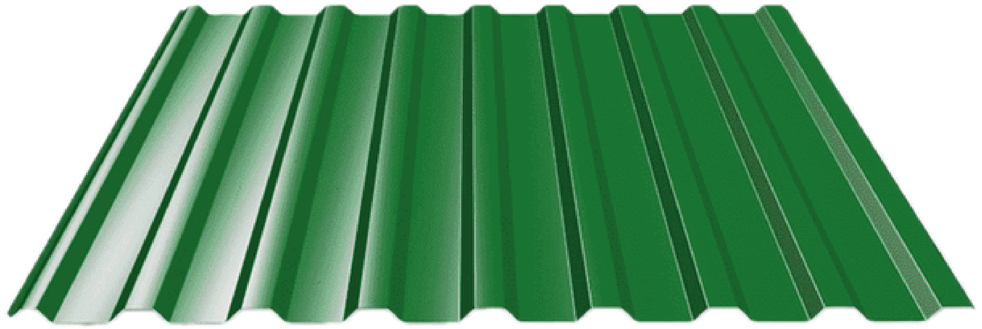
Contrary to their aesthetic reputation, metal roofs are sturdy and long-lasting, when properly maintained, and modern paints and powder coatings make them nearly maintenance-free. In the northeast, metal roofs are making a comeback because of their superior ability to shed snow loads quickly. They are also free of the ice-damming problems associated with shingles and tiles.

Metal roof components are manufactured from steel, galvanized steel (zinc-coated steel), copper, lead, aluminum, and terne (a tin-lead alloy-coated steel). Tin-plated stainless steel is available for locations where regular steel would not last too well, such as salt-air coastal regions.

Above: This is another EPDM membrane. Notice the wrinkles between the sheets. This could easily allow water penetration. These areas need full evaluation.

Metal Shingles





Materials

Steel, either galvanized, painted or both, has been used in sheet form with standing seams, corrugated or in tile format.

Tin is now used primarily as a coating on steel or in an alloy. At one time, pure tin was common both as tiles and as sheet material.

Copper has long been the choice for high-end metal roofs because of its long lifespan. Normally, it is used as standing-seam roofing, but it can also be soldered together (as was the case in the past).

Aluminum is not very common as a residential roofing material, although some shingles of this material are designed to look like wood shakes. It is used extensively in commercial applications where its low weight is a design advantage on wide-span roofs. Aluminum sheet roofing is easy to spot, since it comes in small lengths and has to be installed using rubber gasketed screws through the surface and into the roof decking.

Terne is the same as steel or galvanized steel, and is sometimes used to manufacture both sheet and tile roof coverings.

Lead is not commonly used in North America as anything other than a flashing material. In Europe, however, it was used extensively in sheet form on smaller flat roofs, particularly those with parapet walls and internal drainpipes, because the material is malleable and easy to solder together.

Styles and Installation

Tiles are coming back into fashion. They were common from the early 1900s and still in use until the 1930s. Manufacturers produced unusual designs, aping slate and terracotta. Some used very ornate features, and designs with scalloped edges and diamond shapes were not unusual. All metal tiles have a pressed or embossed design which not only increases their rigidity, but also adds texture to the tile. They sometimes have a granular coating, but most are just painted.

Metal tile roofs were originally installed over plank sheathing and a layer of tar paper, and then fixed to the roof with regular roofing nails. Some designs were also fully interlocking to prevent moisture intrusion.

Modern metal tile roofs can be installed over regular sheet ply or OSB sheathing, with an underlayment of roofing felt. Today's tiles are fully interlocking to provide better weather protection and resist being torn up by high winds.

Standing seam is the product that first comes to mind when discussing metal roofs. Its distinctive ridges serve two purposes: the seams connect one section to the next, and they also hide the bracket that connects the lengths of steel roofing to the decking. Flat-seam roofs generally follow the same pattern but are less pronounced.

Above: This is an unusual roof these days, with copper sheets soldered together on the surface. Also, note the soldered-in-place valley flashing.

Most modern systems are manufactured on site from rolls of coated steel or copper. The rolls are 20 to 24 inches wide and typically come in 50-foot lengths. The metal is cut to length and then fed through a forming machine that folds up the two outside edges to form a pan (normally, 1¼ inches high, and the other 1½ inches high when butted together). The extra 1/4-inch is folded over the adjacent flange, and then both are folded over again, with the clip holding the material to the decking sandwiched in the middle.

Some older copper roofs have over-locking standing or flat seam, and were also soldered together where the plane of the roof was too long to be spanned by a single sheet.

Older sheet-metal systems came in only 8-foot lengths, so inspectors will sometimes see an over-locked or flat seam joint part of the way down the roof plane.

All metal roofs can be installed over plank or sheet roof sheathing, but they should all be installed with a tar paper or roofing felt underlayment. Also, since metal systems do not breathe well, the roof ventilation needs to be sound in order to cope with moisture issues. This tends to be less of an issue on older homes, but modern homes with metal roofs need to have properly designed ventilation.

Many older homes were fitted with **corrugated sheet metal** roofing, usually made of steel, galvanized or terne. Although some find it aesthetically displeasing, it is used all over the United States, which speaks volumes for its longevity. It was normally installed over plank sheathing with a layer of tar paper underneath, with the sheets overlapping by one corrugation, and with sheets above overlapping those below.

In most cases, the installation and flashing of metal roof systems is just like clay or concrete tiles.

Above: This is also a metal roof -- in this case, designed to look like Spanish tile.

At left, At an installer is crimping together the seams on a metal roof.

Inspecting Metal Roofs

The major areas to observe when inspecting a metal roof are:

Above: This photo shows a standard corrugated s teel roof (top-fixed). The panels have lifted, probably due to wind uplift and poor fastening.

- mechanical damage from branches or other impact;
- rust, in the case of steel or coated roofs;
- signs of repairs; splitting along seams;
- galvanic reactions between dissimilar metals (for example, aluminum vents are a bad match for steel roofs);
- paint peeling from the surface;
- and damaged, rotten or missing flashings.

Above: This is an aluminum tile roof showing severe wind damage.

Below: This is a metal tile roof designed to look like concrete tile. The nail in the face should not be there. (Courtesy of Russel Ray)

Below: This a commercial metal roof showing the result of condensate from an HVAC system acting on the roof.

What to report for metal roofing:

- the material and style of the roofing;
- how it was inspected;
- missing and damaged components;
- splitting seams;
- loose tiles;
- signs of rusting;
- painted finishes in poor condition;
- signs of previous repairs; and
- flashing issues.

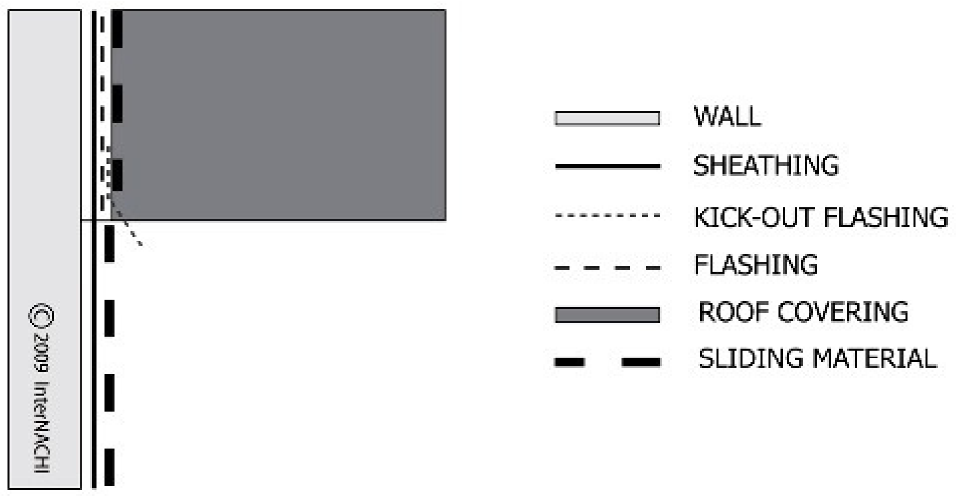
ROOFING ODDITIES

Although this section is intended as light relief, some of these systems are more common than inspectors may realize.

Plastic Corrugated Roofing

Nearly everyone has seen this material installed over a carport or homeowner-built lean-to. Obviously, any attempt to walk this type of roof is extremely unsafe.

Kickout Flashings



In any location where a roof-wall flashing exists and the roof terminates on the wall, a kickout flashing should be installed.

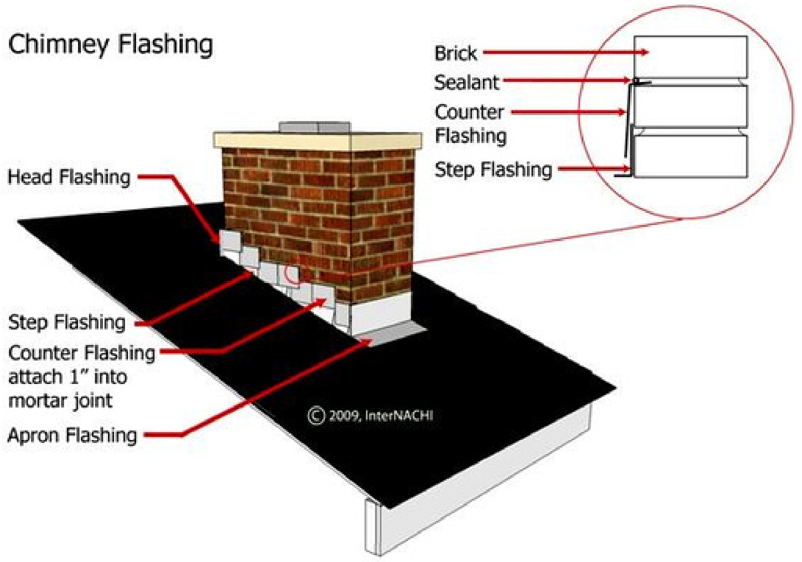
This flashing is designed to prevent water from running down the flashing and entering the wall system by diverting the flow away from the bottom of the roof-wall interface and to the side outside of the siding material.

CHIMNEY FLASHINGS

Traditional brick chimney flashings and manufactured fireplace flashings are usually quite large and also relatively complex, so the chimney flashings tend to be highly susceptible to moisture intrusion.

Traditional Chimney Flashings

In many applications, the primary chimney flashings are **step flashings,** which can be found between any traditional shingle roof and a vertical surface. The image at right illustrates the most common application of step flashings against a brick chimney.



Apron flashings should be at the lowest face of the chimney, directing moisture away from the top-most edge of the shingles or tiles where they abut the chimney.

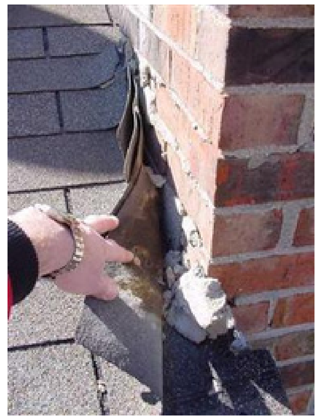
Head flashings are required on all chimneys less than 30 inches wide. They should be comprised of both a base flashing and a counter-flashing. Ideally, the counter-flashing should extend for about an inch past the sides of the chimney.

When the top-side of the chimney is wider than 30 inches, a **cricket or saddle (a small gable flashing)** needs to be installed. This is used to direct water flow from behind the chimney around to the sides. The size and pitch of the cricket is in proportion to the pitch of the roof and the width of the chimney (see table below).

Chimney Cricket/Saddle Requirements

Roof Pitch	Height Requirement
12:12	1/2 of chimney's width
8:12	1/3 of chimney's width
6:12	1/4 of chimney's width
4:12	1/6 of chimney's width
3:12	1/8 of chimney's width

For example, a roof of 6:12 pitch with a chimney 42 inches wide would require a cricket or saddle of 1/4 of 42, or 10½ inches high.

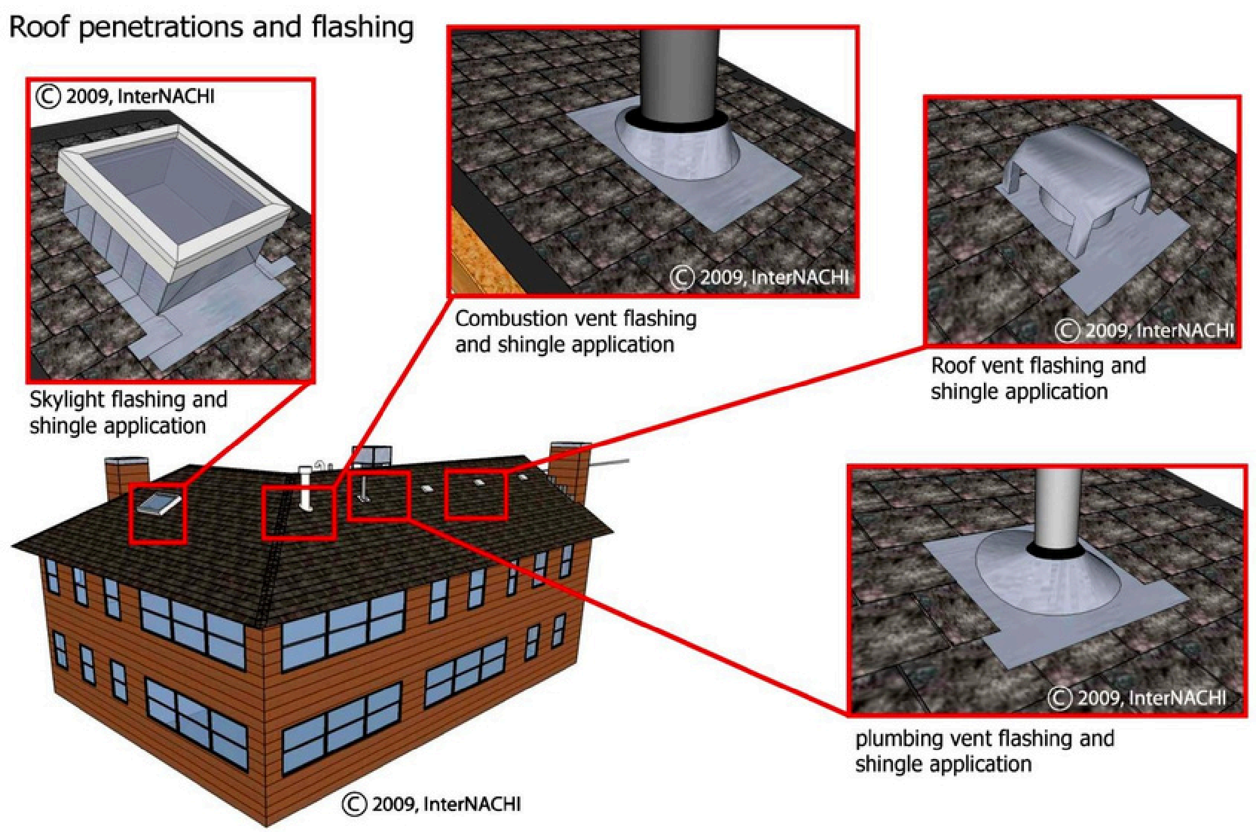


Above left: Based on the number of bricks, a chimney cricket should have been installed.

Above right: Tin foil used as a chimney flashing is useless and wrong.

At right: The flashing is missing. The shingles continue up the sides of the chimney and were foamed in place.

VENTS AND OTHER PENETRATIONS



On any roofing system, the most common failures are those associated with any component that projects through the roof covering. In many cases where a roof has been re-covered, the original flashings have either been damaged or re-installed incorrectly, leading to leaks into the interior.

Plumbing Vents

Depending on location, there are primarily two different types of plumbing vent flashing. The most common in northern climates is the neoprene or metal boot. In Florida and in many other southern states, a lead flashing, which also protects the plastic vent pipe from ultraviolet damage, is more common.

Through-the-roof dome lights, like the one pictured below, are most commonly retro-fitted and frequently cause leakage problems.

Skylights

Most skylights show signs of moisture penetration. This is especially a problem when the roof has been re-covered and the original flashings were damaged while being removed and re-installed.

At left: This plastic vent flashing has been installed upside down. This will probably allow moisture to travel down the outside of the vent pipe.

Below: The top of this flashing is not tucked under the seam of the shingle. Water will pour right in. (Courtesy of Homegauge)

Below: This galvanized flashing has been installed improperly. The upper part of it should be under the shingles, and the roofing tar is a further sign of a poor repair.

Below: A skylight in a metal roof shows damage to the roof on the top-side.

Above: This is a plastic vent flashing which was damaged by raccoons.

At right: This flashing has been improperly installed because the base should be underneath the shingles.

ROOF VENTILATION

BASIC VENTILATION

Poor ventilation causes many problems, not the least of which is substantial reduction in the lifespan of asphalt-based roof coverings.

General Venting Requirements

All attic spaces require ventilation at a minimum rate of 1 square foot of venting per 150 square feet of attic area. This may be reduced to 1 square foot of ventilation per 300 square feet of attic space where most of the vents are high on the roof and air flow is induced from a lower point, as is the case with ridge and soffit vents.

The "1-in-300 Rule" may also apply where a vapor barrier is installed on the warm side of the ceiling.

These basic rules apply both to traditional attic spaces and to enclosed areas where the ceiling material is applied directly to the underside of the roof rafters, as one would find with a cathedral ceiling.

The primary reason for these requirements is to allow moisture-laden air to be evacuated from the attic space, and also to attempt to balance the temperature of the roof coverings and sheathing with that of the outside air.

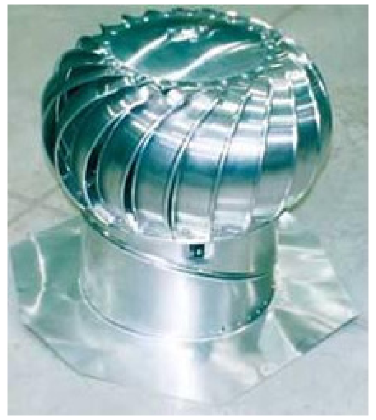
Venting Types

There are many methods employed to achieve adequate venting, among them:

- **gable vents,** which are screened openings in the gable ends, allowing cross-ventilation;
- **turbine vents,** which are wind-powered vents that promote air flow out of the roof area;
- **passive vents,** which are used to provide some air flow between the sheathing and ceiling areas on flat or low-pitch roofs;
- **soffit and ridge vents,** which are installed so air can be drawn from cooler air at the soffit and exhausted through the ridge vents. This style is the most common in new construction and is generally considered to be the most efficient;
- **powered vents** use a thermostat or a switch in the attic space to energize the fan when the attic air reaches a pre-set temperature; and
- **combination venting,** which refers to employing two or more of these methods described, and, in some areas, using through-the-roof vents installed a few feet below the ridge line.

Above: The terracotta pipes shown in this wall are, in fact, part of a passive ventilation system for the flat roof above.

Above: This is the roof outlet for the vent system in the photo at the far left.



Above: This is a turbine vent showing its flashing.

Above: Gable vents come in all styles, so be sure to check that they are merely decorative, especially if there is no other ventilation.

Above: This is an attic fan powered by a solar energy source.

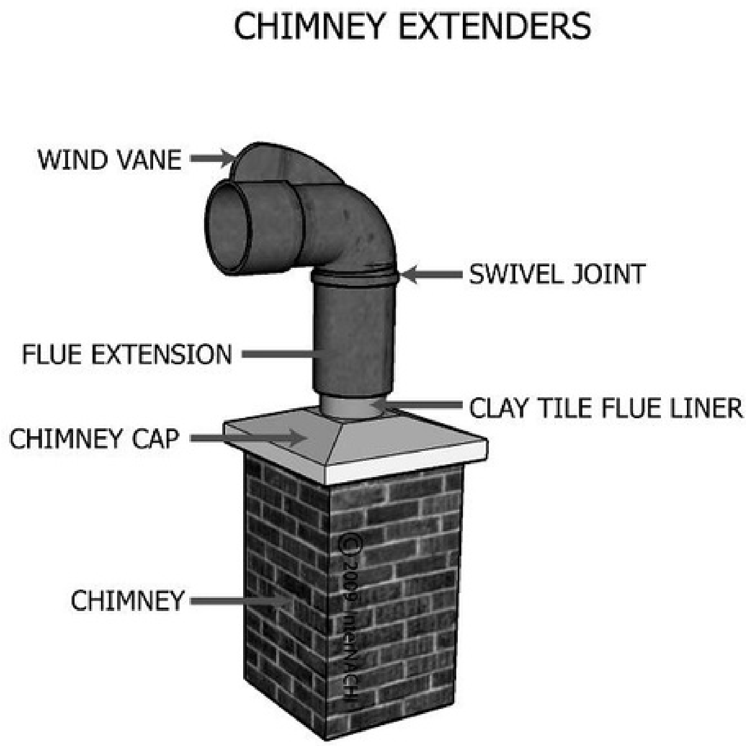
Vent Problems

As with any other system, roof venting may have been installed incorrectly, may not have enough area, may have been rendered inoperable by changes to the home, or may have been badly modified by the homeowner in an attempt to save energy.

INSPECTING CHIMNEYS

MASONRY CHIMNEYS

A visual inspection of the outer chimney structure should be performed along with inspection of the roof covering.



On most homes, the chimney will usually be the largest projection through the roof, or the component with the longest flashed area abutting the roof. Proper flashings, therefore, are of the utmost importance. Also, the structure should be inspected for signs of moisture intrusion and failure.

General Chimney Requirements

All chimneys are required to meet a minimum standard for height above the roof coverings. The basic rule for this is:

a minimum of 3 feet high,
as well as 2 feet higher than any roof
within 10 feet horizontally.

Masonry Structures

Most chimneys are manufactured with brick, stone or concrete blocks, some of which may be part of a manufactured chimney system. All chimney systems should be visually inspected for signs of deterioration, which can lead to moisture intrusion of the chimney system.

Masonry Failures

Masonry systems are not maintenance-free and will fail over time. The most common failures are those related to weathering of either the masonry itself or the mortar that holds it together. Deterioration of the masonry or the mortar will allow moisture into the chimney structure, accelerating other problems. It’s common, particularly in the northern United States, to see brick work that is missing its face.

This is caused by moisture saturating the brick and then freezing, pushing off the front face. Once this has happened, the brick will erode very quickly because the inside of the brick is relatively soft.

Inspectors will also see signs of the mortar failing in the joints between the bricks. This happens as the mortar breaks down and becomes powdery. The cure for this is to have a mason scrape out the affected mortar and replace it with fresh mortar. This process is called re-pointing. Erosion of the brick and mortar is called spalling.

Above: This chimney has not been maintained at all, leading to a full collapse. (Courtesy of Jeff Pope)

Above: A block chimney is showing such severe cracking that the top three courses are completely loose. (Courtesy of Joe Myers)

Above: A brick is missing and the mortar is spalling out.

Chimney Crown Failures

All chimney systems should have crowns installed. They serve two purposes. First, they seal the area between the chimney flue and the masonry structure, preventing rainwater from running down the outside of the flue within the chimney. Second, the crown generally extends beyond the masonry structure so that the water drips off the edge, rather than wicking into the brick or block work. The chimney crown, which is usually made of poured concrete, should be pitched downward, away from the chimney flue.

Above: This chimney has no cap or liner all. It is no longer legal to build an unlined chimney.

Above: Cracking can be seen both in the liner and in the chimney cap. This damage was caused by a flue fire.

Above: cracking in the chimney cap

Rain Caps

A rain cap should not be confused with a chimney cap. A rain cap is installed to protect the inside of the chimney flue from both weather and wildlife intrusion. In some cases, a rain cap can also be helpful in preventing downdrafts into the flue. It is also not uncommon to see a rain cap acting as a damper for a traditional fireplace.

Rain caps are always manufactured out of metal. The best-quality ones are made from stainless steel or copper. Many are manufactured from galvanized steel, which tend not to last as well in-service and will frequently rust out. Some jurisdictions also require rain caps that incorporate spark arresters, especially in arid regions where wildfires are relatively common occurrences.

Above: The flue on the left has been sealed with concrete, and the flue on the right has a rain cap. However, the chimney cap itself is cracked and the brick work is showing signs of efflorescence.

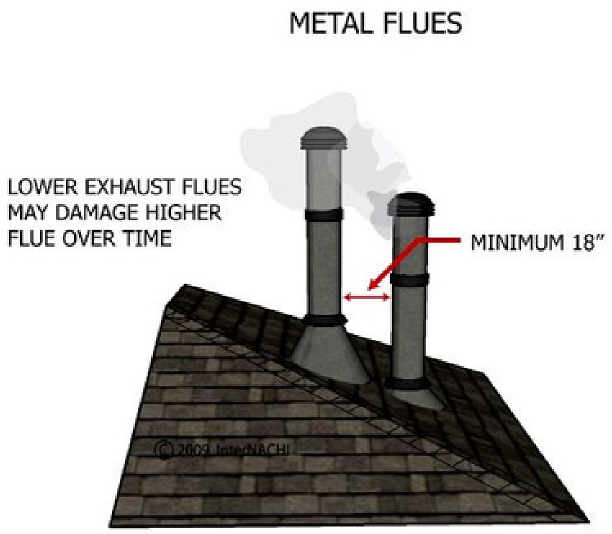
Above: This rain cap is completely choked with creosote, which is not unusual to find when the homeowner has been burning unseasoned timber.

At left: A specially designed copper rain cap protects this double-flue chimney.

Chimney Flues

While the inspection of chimney flues is a highly specialized procedure, any obvious deficiencies in the flue should be noted. In particular, pay attention to flues that are damaged, collapsed, or show signs of previous chimney fires. Extra care must be taken when inspecting chimney systems that are being used to vent fossil-fuel appliances, such as boilers, furnaces, water heaters and manufactured fireplaces, as any deficiency in either the liner or the chimney structure could be a potential fire starter, or could allow carbon monoxide into the habitable space within the home. It is now required that any traditional flues being used as vents for these appliances be fitted with continuous metal flue liners to ensure that no noxious gases can find their way into the home.

MANUFACTURED CHIMNEYS



The term "manufactured chimney" generally relates to prefabricated chimney components, as opposed to a traditional chimney that would normally be manufactured from masonry products.

In most new housing, a manufactured chimney typically consists of a steel vent or flue built inside an artificial chimney stack. For the most part, the clearance requirements are the same as for any other chimney system; however, special attention must be paid to the proper clearance of combustibles where the chimney or vent passes through the roof covering.

General Chimney Requirements

All chimneys are required to meet a minimum standard for height above the roof coverings. The basic rule for this is exactly the same as for the traditionally built chimney:

a minimum of 3 feet high,
as well as 2 feet higher than any roof
within 10 feet horizontally.

Timber Structures

In most cases, a manufactured chimney flue is covered over with a timber frame structure, and finished in a siding material to match the rest of the property, or a stucco, traditional brick, or masonry veneer covering the structure.

Any failure of the system will allow considerable moisture to enter the general framing of the structure, so it is vital to pay particular attention to any and all flashing systems related to the chimney. In many cases, especially those chimneys that are sided with traditional timber siding, the inspector must ensure that there is at least a 1- to 2-inch clearance between any wooden components and the roof covering.

Carefully inspect the areas of the chimney that abut the roof covering, as there will often be considerable signs of dampness.

In this poorly designed chimney at left, there is no separation between the timber components and the roof, and there are a couple of dead areas which will trap moisture and promote rot.

Chimney Caps

Normally, a manufactured chimney has a metal chimney cap to prevent water from entering the structure between the flue and the framing. Inspectors will often find that this flashing has failed due to moisture ponding on the cap, resulting in rust through this flashing. The rain cap should incorporate a drip edge similar to what one would expect to find under any roof covering. This is required to deflect water away from the vertical sides of the chimney.

At left: Water is ponding on the top of the chimney cap. This will cause it to rot very quickly. Also note the lack of a proper drip edge.

Rain or Termination Caps

Most manufactured chimneys are supplied with rain caps or deflectors built to the manufacturer's specifications. In many areas, these caps or deflectors are required to be installed with spark arresters to prevent sparks from leaving the flue. These are usually manufactured from either aluminum or galvanized steel, and are susceptible to mechanical damage, rusting, and galvanic reaction between dissimilar metals.

Proper Clearances

Due to the fact that all manufactured chimneys have metal flues which conduct heat very efficiently, it is important that proper separation is maintained where the flue passes through any ceiling-floor structures, as well as through the roof sheathing. The minimum acceptable clearance is 2 inches. It is required that an approved thimble is used where the vent goes through the roof sheathing and covering in order to maintain the 2 inches of separation and prevent moisture entry at this point.

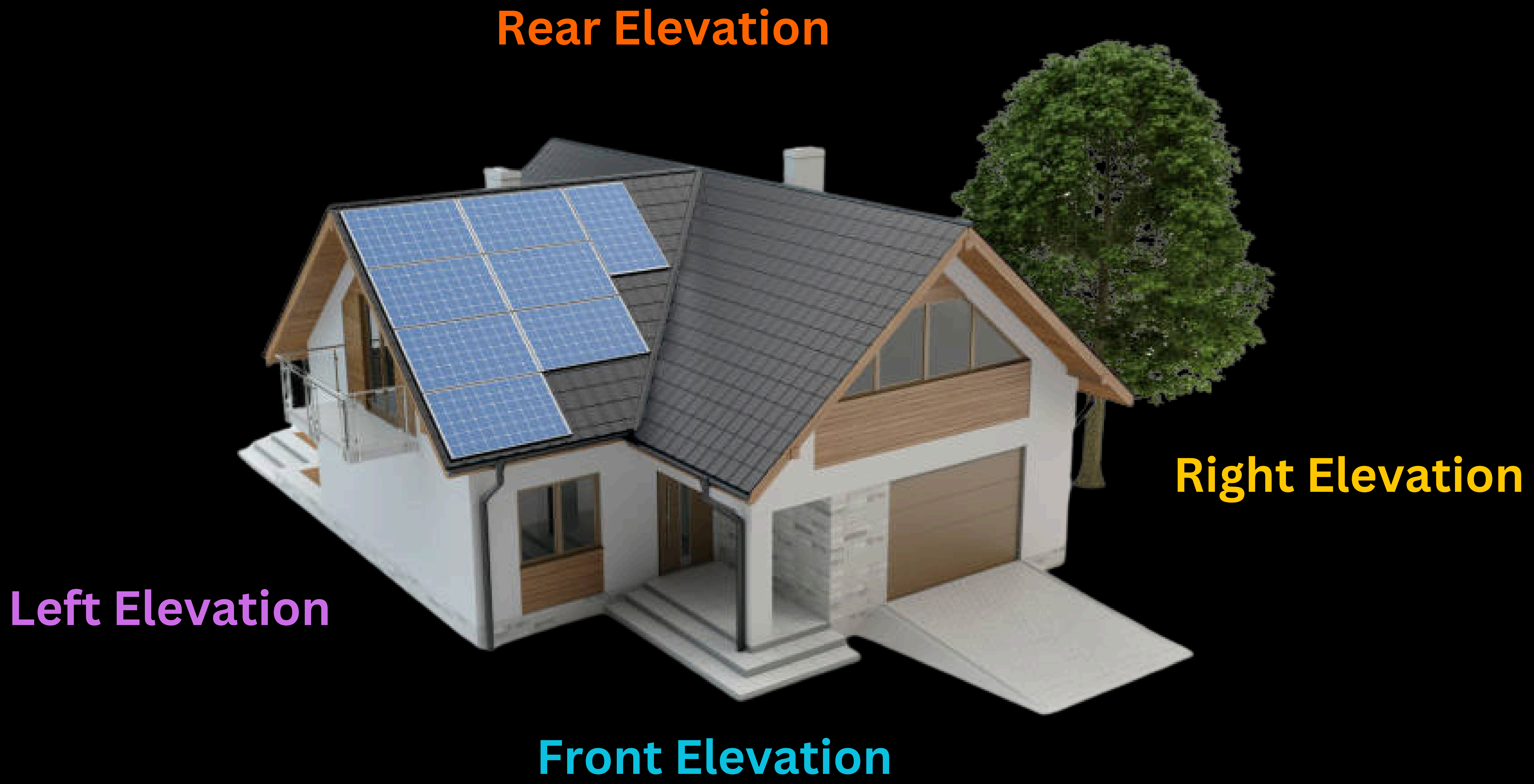
At left: This is a manufactured chimney going through the roof sheathing. The clearance on the right side is probably less than 2 inches. Also, notice how the rafter has been cut.

At right: This is a manufactured chimney without any faux covering. The thimble is acting as both clearance and weatherproofing.

When inspecting manufactured chimney systems, the inspector should pay particular attention to:

- the material that the structure is built from;
- the type of covering;
- any signs of moisture entering the covering or structure;
- the condition of the flashings;
- the condition of the chimney cap;
- the condition of the rain cap or deflector;
- the clearance from combustibles (where visible); and
- the height clearances to adjacent structures.

SCOPE
NOTES
BUILDING A STRONG FILE


Rear Elevation
Right Elevation
Left Elevation
Front Elevation

HOW TO INCREASE YOUR BUDGET

ROOF

High Elevation

- Solar Panels
- Vents / Turbines
- Multiple Layers Covering
- Tarp
- Decking

GROUND

Lower Elevation

Exterior

- Windows
- Gutters
- HVAC
- Vehicles
- Doors / Siding
- Fence

Interior

- Garage
- Rooms
- Walls
- Ceiling
- Electrical
- Floors


Step-by-Step Roof Inspection for Insurance: A Roofer's Expert Guide - Part 1
Copy link
TOP ROOF
INSPECTION
Watch on
YouTube


Drone Roof Inspection Walk Through (2022)
Copy link
7 MIN
WALK THROUGH:
DRONE ROOF
INSPECTION
Watch on YouTube

DAY

3

HOW TO READ

INSURANCE ESTIMATES


How to Read The Insurance Estimate For a Roof Claim & How it Can Help You S...
Copy link
HOW TO:
ROOF CLAIM
ESTIMATES
Watch on YouTube

SCOPE OF LOSS

****ACV Insurance Policy doesn't pay a Depreciation****

RCV VS **ACV**

Replacement Cash value

Actual Cash value

DEPRECIATION

Age / Condition

Below Average / Average / Above Average

SCOPE OF LOSS

ACV
Actual Cash value

(Minus)

DEDUCTIBLE
Paid to Contractor

(=) **NETCLAIM**
Starter Check

RECOVERABLE DEPRECIATION
2nd Check / Closeout

****ACV Insurance Policies doesn’t pay a Recoverable Depreciation****

TEXAS COMPLIANCE LAW

It’s also illegal in Texas for a contractor to offer to waive, rebate, or absorb a property policyholder’s deductible. State law:

- Requires contracts for $1,000 or more that involve an insurance settlement to include a notice that the policyholder must pay the deductible.
- Allows insurance companies to request proof from the policyholder that the deductible was paid.

THE SALES
PROCESS

STEP-BY-STEP

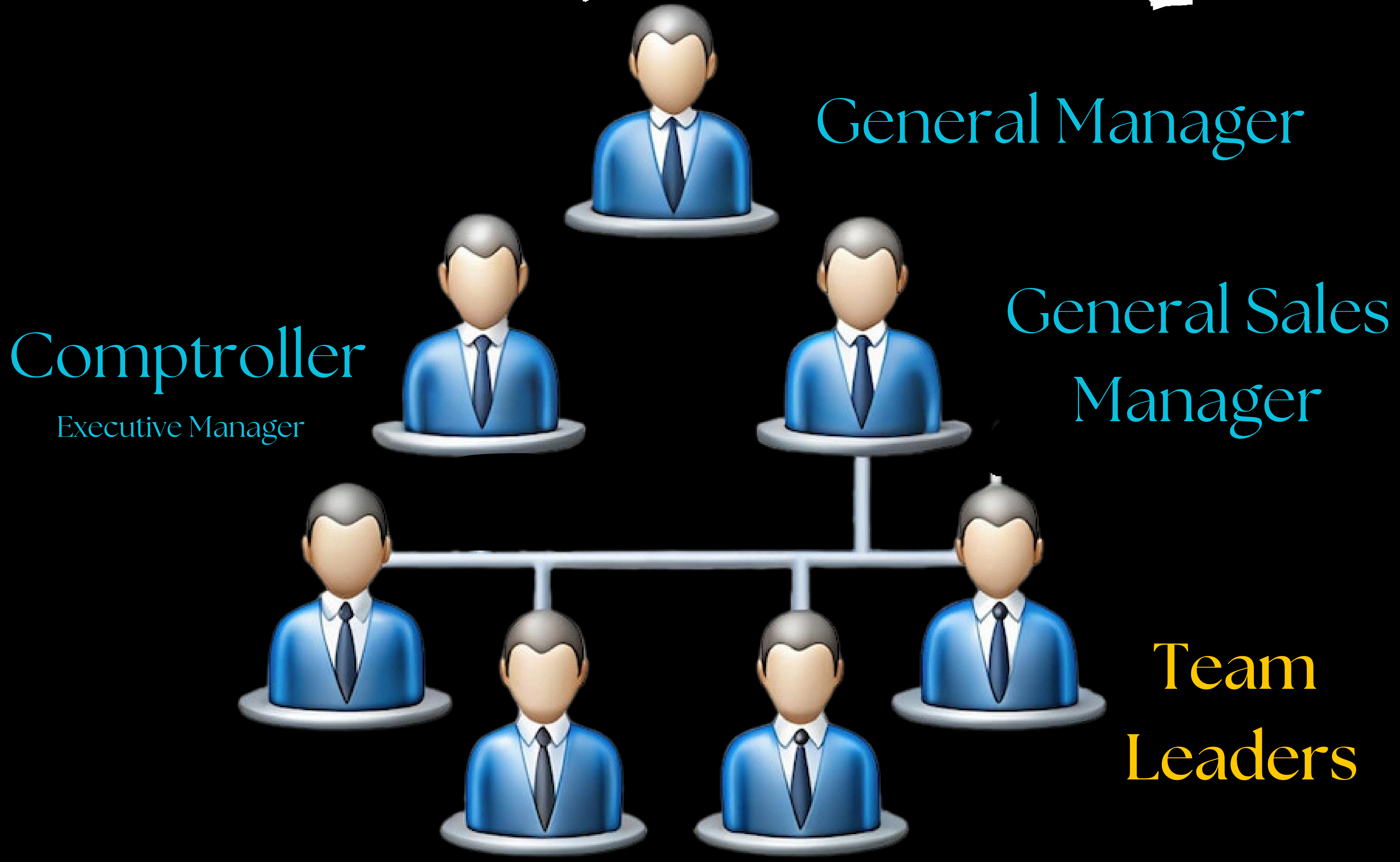
1. **Get On The Roof**
   (Damage Report)
2. **Call In The Claim**
   (Contract)
3. **Make The Meeting**
   (Scope Notes)
4. **Collect The Check**
   (Install Notes & Deduct Pmt Plan)
5. **Submit Your File**
   (Checklist)
6. **Complete The Job**
7. **Final Check Collect**
   (Submit Final Check)
8. **Close The File**
   (Send email to Admin)

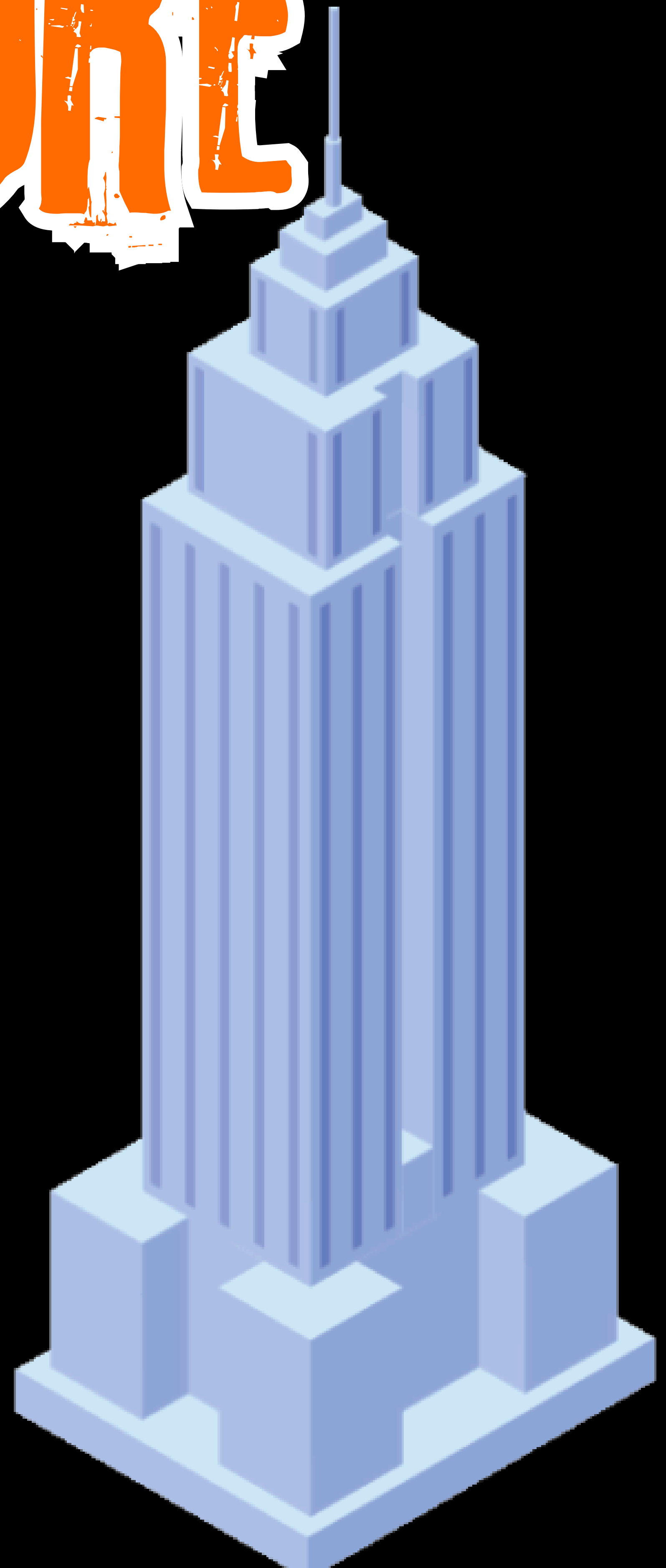
ASK FOR REFERRALS

COMPLETE PACKAGE CHECKLIST

- Damage Report
- Signed Contract
- Scope of Loss (Insurance Estimate)
- Scope Notes
- Install Notes
- Starter Check
- Proof of Deduct. Pmt
- Inspection Photos
- Final Check / Close out

COMPANY STRUCTURE





OUR SERVICES

STORM **RESTORATION**

WATER **MITIGATION**

SOLAR PANEL **INSTALLATION**

FINANCE OPTIONS

Deductible Payment Plan

Customer choice of affordable payments up to 3 years.

IN-HOUSE FINANCING

1. **Pre-qualify** for loan offers in minutes from my Estimate

2. **Compare and select the best offer for you**

3. **Finish application** Receive funds in 1-2 business days[3]

4. **Receive funding** And pay your contractor directly

APRs as low as

4.49%[2]

Acorn
FINANCE
A marketplace of top lenders

Loans from

$1,000 to $100,000

FUND YOUR HOME IMPROVEMENT PROJECT WITH FINANCING

Compare offers from top national lenders

Checking offers does not impact credit score • No home equity required to apply

Terms up to

12 YEARS[1]

EQUAL HOUSING LENDER

TEAM STRUCTURE

TEAM LEADER

(Sales)
Project Manager

(Sales)
Project Manager

(Sales)
Project Manager

(Sales)
Project Manager

PROJECT MANAGERS ALLOWED TO RECRUIT (3) LEAD GENERATORS
(Door Knockers)

ROOF COMMISSIONS

ALL PROJECT MANAGERS

40%
Commission Pay

EXAMPLE:

1st Check - $15,000
2nd Check - $5,000

TOTAL FUNDS COLLECTED:
$20,000

Total Funds Collected: $20,000
Job Cost (Subtract) $8,000

Final Budget $12,000

JOB COST:
$8,000

Commission: **$4,800**

SOLAR COMMISSION

$150
per KW

ALL PROJECT MANAGERS

Example:

Solar System Sold (size):		16 KW	System
	X	$150	per KW

Commission = $2,400

20 CONTRACTS = 5 INSTALLS

(5)
Roof Installs

Monthly Quota

Example: Average Commission = $3,000
(Roof Installs) x 5

Roof Commission = $15,000

All 5 bought 16 KW Solar
($2,400 each solar commission = $12,000) = **$27,000**
Total Commission

DAY

4

SKILLS SHOWDOWN

Show Me Your Skills

Sales	Inspection
(Morning Schedule) Role Play	(After lunch Schedule) Field Play

You have completed our training course

ONBOARDING

ALLIED ROOFING & SOLAR