

# Study Guide for Safe Practices for the Home Inspector Course

This study guide can help you:

- take notes;
- read and study offline;
- organize information; and
- prepare for assignments and assessments.

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This image shows a full page of blank, lined paper. It features approximately 28 horizontal blue or grey lines spaced evenly apart, typical of notebook paper. The lines extend across the entire width of the page, leaving small margins at the top and bottom. There are no vertical lines, text, or other markings on the page.

# Student Verification & Interactivity

## Student Verification

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# Introduction to Inspector Safety



## Welcome

What does "safety in the workplace" mean for the self-employed home inspector?

It starts with knowledge, and then extends to the application of that knowledge to what you do. Safety requires diligence, especially as there is no governmental agency or workplace watchdog to ensure that inspectors are properly protected.

Most importantly, knowledge about safety requires the ability to recognize potentially unsafe situations, and the courage to resist performing those inspection tasks that many believe come with the territory, because they don't have to. After all, your life is worth more than the amount you charge to perform an inspection.

This course covers everyday hazards as well as potentially dangerous conditions that home inspectors may encounter during inspections.

Because there is no governmental oversight agency that regulates what inspectors do on the job, learning about safety is a matter of personal responsibility. Successfully completing a course on inspection safety is a good start, but even more important is implementing what you learn. Simply knowing that dangerous conditions exist is not



enough. Appropriate action needs to be taken. This can mean making sure that you have the proper equipment available and ensuring that it's in good condition, and taking the time to learn to use it properly. It also means learning where to look, knowing what to look for, and using good judgment before you take action.

Potentially hazardous conditions are not always obvious, so inspectors should remember to be vigilant about certain dangers, depending on the circumstances, home conditions, and even geography and region. Inspectors must take responsibility for learning about the hazardous conditions unique to the areas where they work.

Inspectors also need to be realistic about their physical abilities. The ability to perform certain tasks varies from person to person. A task such as walking a roof or entering a crawlspace that might be easily accomplished by one inspector may be difficult for another. Most of us are aware of our own limitations, which may change over time. For each of us who performs home inspections, knowing our limitations and respecting them will help keep us safe.

## **A Brief Word Regarding OSHA's Role**

While the Occupational Safety and Health Administration (OSHA) establishes and enforces general workplace safety guidelines, be advised that unless you work for or own a multi-inspector firm, OSHA may not be a part of that picture.

If you do work for a multi-inspector firm (or own one), the OSHA rules may apply, including the mandatory implementation of proper training and the issuance of personal protection equipment (PPE).

Although multi-inspector firms and corporations must comply with OSHA regulations, in cases of a complaint or accident involving an individual inspector, OSHA may become involved. Depending on what state an inspector works in, the authority having jurisdiction (AHJ) over safety in the workplace may be federal (such as OSHA), or an OSHA-approved state program. Inspectors wanting more information about whether or to what degree they need to comply with OSHA regulations should contact their regional OSHA office.

Regardless of whether OSHA is involved, the inspector should still be familiar with safe practices for two reasons: personal safety and liability.

The personal safety issue is self-evident. The liability factor is something else. If the inspector believes that a situation is unsafe, there is no obligation to enter into or onto the area. So long as the reason is disclosed, personal safety will trump any perceived duty to inspect a potentially dangerous area.



If the OSHA guidelines back the inspector's opinion as to a potential danger, it may become an excellent defense argument, should the inspector get summoned to court over an alleged faulty inspection where a defect or damage is found in, on or around the area not examined for safety reasons.

This course is not meant to cover all the OSHA guidelines. Its purposes are to raise awareness of potentially hazardous conditions and offer guidelines on how to avoid them.

Regardless of whether an inspection business is required by law to comply with OSHA regulations, inspectors should be familiar with safe practices, and OSHA is a good source for safety guidelines.

Inspectors are sometimes confronted with a situation that requires them to make a decision about whether it is safe to proceed, such as whether to walk a roof or enter a confined space. If an inspector's refusal to undertake a task for safety reasons results in a lawsuit, his position may be strengthened significantly if he can show that the decision was in compliance with OSHA guidelines. For this reason, it is a good idea for inspectors to be familiar with the OSHA regulations that may apply to home inspections.

## Inspector Liability



An inspector's duty regarding safety is not just to himself, but also to his clients.

In 2008, an inspector in Seattle was sued because his client fell through an opening in a floor leading to a crawlspace that he was inspecting, and the client broke his arm in three places. The lawsuit alleged that the inspector was guilty of "negligence and misconduct" because he failed to barricade the opening or notify the client of the potential hazard.

To avoid injuries and lawsuits, inspectors should be aware at all times of the presence of people on the property, and take all necessary precautions to keep them away from hazardous areas under inspection.

One way to do this is to use proper signage.

To avoid such liability and to ensure the safety of all persons present at an inspection, InterNACHI has created compact, lightweight "STOP -- Inspector at Work" signs for inspectors to use at job sites. These signs are specifically designed to be placed on a ladder, or freestanding near the entrance to a crawlspace that's being inspected. Made of strong, durable plastic, they fold up flat and fit securely over the rung of the inspector's ladder. Using one may also provide legal leverage for inspectors who are sued for harm inflicted to their clients during an inspection.

## Other Considerations

Keep in mind that safety is not just about the personal safety of the inspector, but also of those attending the inspection, those living in the home, and those who may enter the home at a later date.



An example of the latter is a contractor who might be hired to correct a problem found during the inspection, such as a plumber who enters a crawlspace and grabs onto a gas pipe to steady himself. If that gas pipe is in contact with energized electrical wiring, such as that shown in the photo, he could suffer an electrical shock or even electrocution.

If you see conditions that represent a serious and immediate danger, do not merely make a recommendation for correction in your report and leave it at that. Make sure that everyone involved in the transaction knows that a dangerous condition exists, and make certain that the occupant and the listing agent understand that it needs to be corrected immediately. Failure to make the appropriate notifications may result in charges of negligence.

When an inspector performs an inspection, he assumes control and responsibility for maintaining safe conditions, identifying unsafe conditions, and making the parties present at the inspection aware of them. Along with control and responsibility, the inspector assumes liability. Inspectors need to be diligent and firm in maintaining control during the inspection.

### Here are a few other conditions to be aware of:

- **Children:** The inspection is not an opportunity for the buyer's entire family to roam and investigate the property while it is being inspected. The occupant's belongings must be respected. The inspector is not there to act as a babysitter. Those present at the inspection should be adults only and should act responsibly. The inspector should be free to perform the inspection without distractions.
- **Pets:** Pets should not be present at an inspection. They are a distraction and a potential hazard to strangers. If the pet belongs to the resident whose home is undergoing an inspection, it should be secured in an area that is not scheduled for inspection, such as in the yard away from the home and any outbuildings. Its whereabouts should be monitored at all times by its owners to ensure that it doesn't become frightened by the activity and break loose and enter the home or run away.
- **Ladders:** Ladders left standing against a building are an open invitation to climb to anyone who happens to walk by. This may be the client, the occupant, an agent

or a neighbor. Often, they will not be covered under your general liability policy, so if you leave your ladder standing after you have walked away and someone climbs it and falls, you may be liable. Fold it, collapse it, put it back on your vehicle, or at least lay it down in the yard, but do not leave it leaning against the building while you move on to other parts of the inspection.

- **Crawlspace hatches:** When the access to the crawlspace is in the floor, you need to make sure that while you are down in the crawlspace, no one comes along and accidentally steps in the hole. Use an InterNACHI "Stay Back" sign to warn others of a dangerous condition.

To avoid injuries and lawsuits, inspectors should be aware at all times of the presence of people on the property, and take all necessary precautions to keep them away from hazardous areas.

## InterNACHI's Res. Standards of Practice

Because federal and state entities offer little in the way of safety regulations for individual home inspectors, the InterNACHI Standards of Practice for Performing a General Home Inspection serves as minimum guidelines for home inspections. It also serves as written documentation for clients specifying the structural elements, systems and components that are included in a standard home inspection, as well as the limitations and exclusions of a standard home inspection. This helps to set clients' expectations and protects inspectors from personal injury and liability.

Some examples from the InterNACHI Residential Standards of Practice designed to promote personal safety are as follows:

The inspector is not required to operate:

- 2.2.II.A. any system that is shut down.
- 2.2.II.E. any shut-off valves or manual stop valves.

For example, inspectors are not required to operate gas valves. If a valve is faulty, it may prove impossible to shut off the flow of gas. If no burner ignition takes place, gas may start filling the home, increasing the danger of catastrophic explosion and fire.

- 2.2.II.F. any electrical disconnect or over-current protection devices.

For example, inspectors are not required to turn on electrical disconnects, such as circuit breakers. Such disconnects may be shut off because the circuit they control is not safe. Activating such a circuit could cause a fire or energize systems or components that might result in electrical shock or electrocution.

- 2.2.II.B. any system that does not function properly.

In addition to the dangers mentioned in the paragraph above, operating a system that does not function properly may damage that system, related systems or components, or portions of the home.

The inspector is not required to:

- 2.2.III.C. enter or access any area that may, in the opinion of the inspector, be unsafe.
- 2.2.III.D. enter crawlspaces or other areas that are unsafe or not readily accessible.
- 2.2.III.E. inspect underground items, such as, but not limited to, lawn-irrigation systems, or underground storage tanks (or indications of their presence), whether abandoned or actively used.
- 2.2.III.F. do anything which, in the inspector's opinion, is likely to be unsafe or dangerous to the inspector or others, or damage property, such as, but not limited to: walking on roof surfaces, climbing ladders, entering attic spaces, or negotiating with pets.
- 3.1.IV.A. walk on any roof surface.
- 3.1.IV.G. walk on any roof areas that appear, in the opinion of the inspector, to be unsafe.
- 3.2.IV.B. inspect items, that are not visible or readily accessible from the ground, including window and door flashing.
- 3.3.IV.A. enter any crawlspaces that are not readily accessible, or where entry could cause damage or pose a hazard to the inspector.
- 3.7.IV.A. insert any tool, probe or device into the main panelboard, sub-panels, distribution panelboards, or electrical fixtures.
- 3.7.IV.B. operate electrical systems that are shut down.
- 3.7.IV.I. activate any electrical systems or branch circuits that are not energized.
- 3.9.IV.A. enter the attic or any unfinished spaces that are not readily accessible, or where entry could cause damage or pose a safety hazard to the inspector, in his or her opinion.

The InterNACHI Residential Standards of Practice are helpful because they give home inspectors the power to make binding decisions in determining which conditions are safe and which aren't. However, if a client is unaware of these Standards, the protection from liability they offer may be reduced. For this reason, it is a good idea for inspectors to maximize their client's awareness of the Standards by including a copy of them in their inspection report, providing a link to them on InterNACHI's website, providing a

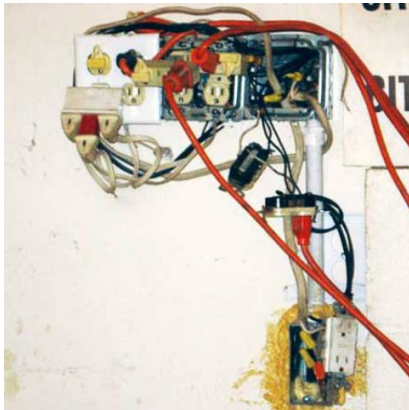
downloadable copy of them in PDF format on their website, and by referencing the Standards in their inspection agreement.

# The Limitations of a Home Inspection

## The Home Inspection Defined

A general home inspection is a visual evaluation of a home's accessible structural elements, major systems, and components to determine whether defects or safety issues exist. The inspection is not technically exhaustive. A "general home inspection," a "standard home inspection" and simply a "home inspection" are all the same thing.

A home inspection is designed to reflect, as accurately as possible, the visible condition of the home at the time of the inspection. Conditions of a home for sale can change radically in only a day or two, so a home inspection is not meant to guarantee the condition of the home on the date of the sale, for example. It's not uncommon for conditions to change between the time of the inspection and the closing date.



*An overloaded outlet with  
no cover*

## It's a Visual Inspection

A visual inspection means that the home inspection report is limited to describing conditions in those parts of the home that the inspector could see during his inspection. Obviously, parts of the home that are permanently hidden by wall, ceiling and floor coverings are excluded, but so are parts of the home that were inaccessible during the inspection for some other reason. Such a reason might include lack of an access point, such as a door or hatch, or a locked access point, or because an occupant's belongings blocked access, or because of dangerous or unsanitary conditions. There can be many more reasons.

The point to remember and to remind the client of is that if the inspector can't see a portion of the home, the inspector can't assume responsibility for ensuring that a safe and proper condition exists or that a system or component within a hidden space is operating properly.

## Safety

Safety can be a matter of perception. Some conditions, such as exposed electrical wiring, are obviously unsafe. Other conditions, such as the presence of mold, aren't as clear-cut.

Using the example of the possible existence of mold, it's difficult to accurately call it out during a general home inspection because mold sometimes grows in places where it can't be readily seen, such as inside walls, making its discovery beyond the scope of the inspection.

Also, mold's dangers to human health are caused by the inhalation of spores from indoor air. Most people with healthy immune systems have little or no problem with inhaling a few random spores. However, other people whose immune systems are compromised by lung disease, asthma or allergies can develop serious or even fatal fungal infections from mold spore levels that wouldn't affect most people. Nearly every home has some mold, and mold colonies can grow very quickly, given the right conditions. Mold can be a safety concern, but it often isn't. The dangers represented by mold are a controversial subject.

## System Defects



Although the majority of the inspection is visual, InterNACHI's Residential Standards of Practice requires inspectors to operate space and water-heating equipment and air-conditioning equipment, if it can be done without damaging the equipment.

Inspectors will also examine the major, accessible components of certain systems, as required by the Standards of Practice, such as a furnace's air filter.

A home inspection is not technically exhaustive, meaning that systems or components will not be disassembled as part of the inspection. For example, an inspector will not partially disassemble a furnace to more accurately check the condition of the heat exchanger. Inspectors typically disclaim heat exchangers.

## Hazardous Materials

Asbestos, mold, lead, water purity, and other environmental issues or potential hazards typically require a specialist inspection, and may additionally require laboratory analysis.

## Home Inspectors Are Generalists

Home inspectors are not experts in every home system, but are generalists trained to recognize evidence of potential problems in the home's various systems and their major components. Inspectors need to know when a problem is serious enough to recommend a specialist inspection. Recommendations are often made for further evaluation or repair by a qualified contractor, such as a plumber, electrician or structural engineer.



## Inspector Qualifications

Very few home inspectors have been in the inspection industry for their entire working lives. According to an InterNACHI poll, about half the home inspectors have a background in the building trades. Those with a construction background started their inspection careers with a general idea of the systems and components they expect to find installed, as well as how those systems age and fail.

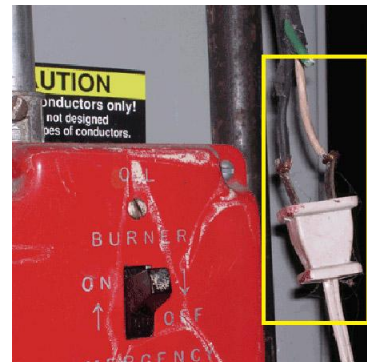


*Above: the result of subfloor movement*

This doesn't mean that inspectors with a background in something other than the building trades are not qualified -- only that they started in the inspection industry at a relative disadvantage. Building the skills and developing the judgment to consistently recognize and interpret evidence correctly and make appropriate recommendations can be improved with practice and Continuing Education.

## Managing Expectations

Part of the home inspector's job is to manage his clients' expectations. This is especially true when a client has never dealt with a home inspector before. Explaining the limitations of a home inspection to a client will help him develop realistic expectations concerning what he is likely to read about in his home inspection report, as well as the items that lie beyond the scope of the inspection.



When a home buyer is interviewing an inspector, the inspector should explain how he handles special safety concerns.

In addition to providing a copy of InterNACHI's Residential Standards of Practice and discussing a home inspection's limitations, another way to manage the homeowner's or home buyer's expectations is to use disclaimers. Disclaimers are portions of an inspection agreement or report in which the inspector notifies the client that he will not accept responsibility for confirming the condition of a portion of the home or particular system or component for some stated reason, especially items that are hidden or obstructed. Creating realistic expectations for the client will help prevent misunderstandings, promote smooth real estate transactions, and keep everyone safe during an inspection.



## **To Exceed or Not to Exceed**

### **InterNACHI's legal counsel, Mark Cohen, weighs in on the pros and cons of exceeding InterNACHI's Residential Standards of Practice for Performing a General Home Inspection or InterNACHI's Standards of Practice for Inspecting Commercial Properties:**

Inspectors sometimes ask about the potential legal consequences if their inspections go beyond what InterNACHI's Residential Standards of Practice (SOP) requires. Of course, every inspection must, at a minimum, substantially meet the requirements of the SOP. If an inspector fails to comply with the SOP, the client would have valid claims against the inspector for breach of contract and misrepresentation.

Therefore, when in doubt about what the SOP requires in a particular situation, the inspector should err on the side of caution and exceed what the SOP requires. It is better to do a little more than what may be required than to do less and risk a potential claim and harm to your reputation.

## **A Word of Caution**

If an inspector consistently goes far beyond what the SOP requires, a client might successfully argue that the inspector voluntarily assumed a duty greater than the contract required. Most inspection contracts contain language stating that the inspector will perform the inspection in accordance with InterNACHI's SOP. An inspector who goes far beyond what the SOP requires may open himself up to a claim that there was an oral agreement that he was going to do a more rigorous inspection than what's required by the SOP.

If an inspector voluntarily assumes a duty greater than the duty required by the contract, the inspector has an obligation to perform those additional tasks with reasonable care.

## **14 Steps That Help Inspectors Avoid Lawsuits**

**The following are 14 easy and inexpensive steps that inspectors can take to help prevent lawsuits.**

### **#1 Join InterNACHI, of course!**

InterNACHI is the world's largest inspection trade association, and its Standards of Practice can be pointed to as definitive for the inspection industry. Substantially abiding by InterNACHI's Standards of Practice provides a strong defense against a claim that you failed to perform to a level of care or acceptable practice for the inspection profession.

Furthermore, InterNACHI's membership requirements are in addition to whatever your local, state or provincial government licensing and regulation may demand. Membership is evidence that you are the type of inspector who voluntarily goes above and beyond the minimum requirements that merely allow you to legally operate in your area.  
Not a member?

## **#2 Incorporate.**

As a shareholder in your incorporated inspection company, you enjoy limited liability for the corporation's debts and judgments against the corporation. No inspector should operate as a partner or sole proprietor... ever.

## **#3 Take every one of InterNACHI's online courses.**

We all know that many claims against inspectors are frivolous. Education and training won't prevent such suits from being filed, but education and training will help you prevail in court. Each of InterNACHI's online courses produces a Certificate of Completion. You should be prepared to produce all your certificates as evidence of your professionalism. However, the dates of completion have to precede the date of the inspection in question, so complete them now.

Furthermore, education and training are key to performing high-quality inspections, which eliminates frivolous suits. Knowledge is a powerful tool you can use to stay out of court--or win, if you should find yourself there.

## **#4 Never refer to yourself as an "expert" in your marketing.**

Home inspectors are generalists, not experts. The word "expert" has a particular meaning in the legal profession. Experts are specialists who are held to a higher standard of care than the ordinary (non-expert) inspector.

## **#5 If you are going to hire a helper, use a contract.**

I prefer to hire helpers as independent contractors rather than employees. A good independent contractor agreement makes it difficult for a helper to:

- bind you or your inspection company into a contract;
- incur any liability on your behalf;
- claim rights associated with your publications, trade secrets, copyrights or trademarks;
- reveal your confidential information, such as marketing ideas, business plans, pricing strategies, etc.;
- steal your real estate agent database or solicit your clients;
- compel you to pay his expenses, insurance premiums or taxes;
- demand severance pay; or
- later claim he was an employee or is owed money.

## **#6 Turn away some consumers.**

You don't have to accept work from everyone who wants to retain you. If a client starts off being difficult or unreasonable, it usually gets worse, not better. While it may be hard to walk away from an inspection fee, it's sometimes cheaper in the long run.

Furthermore, an added bonus of refusing to allow these consumers to become your clients is that they'll become your competitors' clients. Pity your competitors!

## **#7 Use InterNACHI's Pre-Inspection Agreement.**

It is designed to work hand-in-hand with InterNACHI's Standards of Practice and includes:

- a definition of the scope of the inspection;
- a disclaimer of warranties;
- a limitation on liability, and a liquidated-damages provision;
- a provision for payment of costs and attorney's fees;
- a "merger clause" stating that there are no promises other than those set forth in the agreement, and that all prior discussions are merged into the agreement;
- a clause stating that any modification of the agreement must be in writing;
- a forum selection clause so that any lawsuit must be filed in the county or district where the inspector has its principal place of business; and
- a personal guaranty of payment if the client is a corporation or similar entity.

## **#8 Purchase InterNACHI's "*Stay Back*" stop sign for \$29.95.**

In 2009, a home inspector opened a floor hatch to go down into a crawlspace to inspect it. While inspecting, his client fell into the opening, breaking his arm in three places. The client sued. The suit claimed that the inspector was negligent for not putting up a "caution" sign.

Also in 2009, a home inspector was on the roof of a home he was inspecting. A newer real estate agent decided to climb up the ladder to join the inspector. She slipped, fell seven feet, and landed on top of the client who was steadying the ladder for the agent. Both suffered injuries that required them to be hospitalized. The client sued the inspector for not posting a sign to keep others off his ladder.

It gets worse. An inspector was recently blamed for an unsafe condition that already existed. During the review at the end of a home inspection, the inspector pointed out severely rotted deck planking. The client walked out onto the deck to see what the inspector was talking about when the client's foot broke through the decking, causing

minor injury. The client didn't sue, but later complained to the real estate agent that the inspector should have kept everyone off the deck, once he discovered the issue.

The InterNACHI "Stay Back" stop sign does four things:

- It shows that you care about your clients' safety.
- It reminds everyone that there are risks, especially to children, in attending an inspection.
- It actually keeps your clients at a safe distance.
- It demonstrates in court that you are not reckless.

In designing these signs, our attorneys advised us to use a "stop" sign rather than a "caution" sign, as "caution" implies to proceed (to go ahead and climb the ladder, for instance), but with caution. A "stop" sign is clear and unambiguous.

## **#9 Take three photos of the water meter before you leave the property.**

You never want to be accused of failing to note a water line leak, or--worse--causing water damage because you forgot to turn off a fixture. One way you can prevent this is to take some photos of the water meter just prior to leaving the property.

Take these photos after you've:

- completed your home inspection;
- turned off all the sink and tub faucets after checking them for functional flow; and
- made sure that the washing machine, dishwasher, sprinkler system, and any other water-using systems, devices and fixtures are off.

Take three photos of the water meter that show that no water lines are leaking, assuming you didn't find any.

## **#10 Write your reports properly with InterNACHI's library of narratives.**

This library is the world's largest collection of dedicated, industry-savvy home inspection narratives. These narratives were developed using a variety of sources, including the International Residential Code (IRC), technical data sheets, and systems specifications from various manufacturers' associations, installation manuals for a variety of building products, and various building science-related sites. Narratives are worded with safety in mind, and specific code is not quoted.

In addition to reducing the amount of time you spend filling out reports, the quality of your reports will improve, and you'll enjoy greater protection from liability.

## **#11 Include InterNACHI's "Estimated Life Expectancy Chart" with every report.**

This chart details the predicted life expectancy of household materials, systems and components so that you don't have to. Life expectancy varies with usage, weather, installation, maintenance and quality of materials. This chart provides your client a general guideline from the world's largest inspection association -- not a guarantee or warranty -- and a reminder that there is no guarantee or warranty is stated at the bottom of the chart.

### **#12 Use InterNACHI's "*Now That You've Had a Home Inspection*" home maintenance book.**

The book is also written specifically to reduce your liability by reminding your clients that a home inspection does not reveal every defect that exists, that certain issues are outside the scope of a home inspection, and that a homeowner is now responsible for maintaining their home. It works well with the *Survey* (below). Also, read this advice from InterNACHI's legal counsel: <http://www.nachi.org/documents2012/inspector-legal-defense.pdf>

### **#13 Use InterNACHI's *Client Satisfaction Survey*.**

Often, a dissatisfied client will describe their perception of your services to his/her agent, or, worse... to a judge, inaccurately. Procuring and maintaining a copy of this survey will bring them back to Earth, so to speak. It is a handy document to have to present to a complaining agent, and can often end a legal action all by itself. It is the next best thing to a deposition. The *Client Satisfaction Survey* creates a factual record of the client's version of events surrounding the inspection in the relevant time frame, thus inhibiting the client's ability to change his story to fit the circumstances of a later claim.

### **#14 If you settle a dispute with a client, get a signed release.**

Right or wrong, in some cases, it makes sense to cut a deal with a complaining client to avoid a lawsuit.

Never apologize. An apology may be used to support a future claim that you were negligent. If you have to pay to have a repair done to correct a defect your client claims you "missed," always ask for a handwritten letter of reference thanking you for quickly solving the issue. Then take a stack of those letters back to the referring agent, brag about how you paid to keep your mutual client happy, and ask that the stack be passed out at the next real estate sales meeting.

Also, after you get the reference letter, get a release signed to end the issue forever.

Also, InterNACHI has built the release into its free, online agreement system for you to procure the release digitally.

# Quiz 1

T/F: Individual home inspectors are never subject to OSHA regulations.

- False
- True

The InterNACHI Residential Standards of Practice are \_\_\_\_\_.

- minimum guidelines
- not to be exceeded
- general recommendations
- variable from state to state

T/F: According to the InterNACHI Residential Standards of Practice, inspectors are required to test valves and electrical disconnects by operating them.

- False
- True

According to the InterNACHI Residential Standards of Practice, the decision as to whether a space is safe to enter is determined by \_\_\_\_\_.

- the inspector
- building codes
- the Standards
- OSHA

T/F: According to the InterNACHI Residential Standards of Practice, inspectors are not required to activate branch electrical circuits that are shut down.

- True
- False

The InterNACHI Residential Standards of Practice help limit \_\_\_\_\_.

- liability
- inspection fees
- driving mileage
- insurance costs

Unattended ladders left in place during the inspection are a(n) \_\_\_\_\_ issue.

- liability
- theft

- efficiency
- inspection

T/F: An inspector performing an inspection assumes responsibility for the safety of those present at the inspection.

- True
- False

## Basic Tools and Tips

### Apparel for Safety and Professionalism

Inspectors should always be aware that their personal appearance as well as that of their work vehicles sends a message to their clients and others important to their business and professional reputation. Whether that message is one that conveys a sense of trust and reliability is up to the inspector.

InterNACHI has some great information and advice on appropriate inspector attire and work vehicles (both serious and humorous). The considerations regarding vehicles are self-evident as well as relevant regardless of the job or activity. But our tips on work clothing also have safety implications, which is why some of them are worth repeating in this course on inspector safety.

### Clothing & Footwear

- Never arrive to an inspection in dirty clothes. It is fine for clothes to get dirty during the inspection because the client expects this to happen, but if you have more than one inspection scheduled for the day, consider bringing a change of clothes, or at least a fresh shirt. Hygiene and safety go hand in hand.
- Consider bringing coveralls or a Tyvek® suit. They will keep your clothing from getting dirty while you crawl through attics and crawlspaces. A Tyvek® suit is a one-piece garment, usually white in color, that inspectors can wear while working in areas -- especially crawlspaces, attics, and other unfinished spaces -- where they may encounter rodents, lead dust, asbestos or chemicals. Mechanics also commonly wear Tyvek® suits to avoid contact with oil and fuel because they are chemical-resistant. Due to its neutral pH, Tyvek® is resistant to most acids, bases and salts. Tyvek® will melt and shrink away from a flame, and it will burn at approximately 750° F. It can also give off a static charge if not pre-treated with an anti-static coating, but the manufacturer's label on your Tyvek® suit will ensure that it's the proper class of material for its use.

- Dress for the type of property. Inspecting a horse ranch may require boots. A dentist's office may require shoe covers or booties.
- Dress for the weather and climate. Shorts and short-sleeve or polo shirts are fine during warm weather and in southern and beach areas, as long as they're laundered and tidy-looking, but they're often not appropriate or adequate for cooler, northern climates or during fall or winter. Cut-off jeans or gym shorts are not appropriate, but khakis and jeans can be, depending on the client base, especially if they have pockets that can hold smaller inspection items and equipment. Sleeveless shirts or any type of t-shirts emblazoned with logos or images not related to the inspection company are never appropriate. T-shirts printed with sports team logos, political themes or pop-culture references or images can passively offend clients. Investing in work attire that has your company's or InterNACHI's logo takes the guesswork out of how to dress each day for the job.
- A suit is not appropriate, as it implies that you are not dressed to inspect crawlspaces. A rare exception is made for leaders of multiple inspection teams or inspectors conducting a pre- or post-inspection meeting.
- It is acceptable for inspection clothes to be loose-fitting. Inspection requires a great deal of reaching, climbing and crawling -- activities that will be made more difficult by tight or restrictive clothing. Inspectors should be prepared for a dirty and strenuous job.
- Shoes should be lace-up and rugged. Laces ensure that feet will not slip out of the shoes.

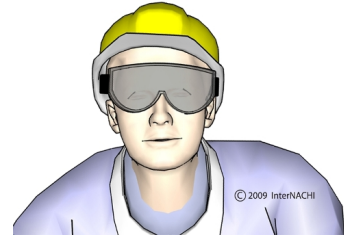
In warmer climates or on summer days, clean sneakers or casual shoes are appropriate. Open-toed sandals are not appropriate, even in summer.

- Bring an extra pair of shoes or shoe covers or booties. Boots or work shoes can be swapped for slippers or sneakers before entering living areas, or they can be covered with booties. Never track dirt, mud, roofing tar, or pet droppings into a home. Also, some customs require the removal of shoes and hats upon entry.
- Female inspectors should not, of course, wear dresses or heels.
- A head covering, such as a ball cap, is useful in areas where a hard hat is not required in order to keep debris and dust out of one's hair, which can be transferred indoors to the client's living area, as well as inside the inspector's work vehicle. Some types of nuisance debris can include small insects, cobwebs, insect or rodent fecal matter or its dust, asbestos dust, lead paint dust, pet dander, mold spores, and other allergens that may be irritating. As with t-shirts, ball caps should not display any type of logo or imprint that is not related to the inspection business or association.



# Personal Protection Equipment (PPE)

The process of inspecting for safety defects can itself compromise the safety of inspectors and their clients. The subject of personal protection equipment, or PPE, is a significant one for the industry. With one-man operations, the choice as to what should be worn and when is up to a single person. However, with multi-inspector firms, the questions become more complicated.



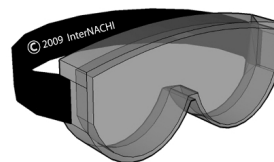
So, what is an inspector supposed to do? PPE configurations are varied and numerous. Guidelines can be vague and often open to interpretation.

Inspectors should use the following basic types of PPE to ensure that inspections proceed problem-free. These are a solid start to personal safety:

- **Clothing:** As noted earlier, be sure that the clothing you're wearing is comfortable but not too loose. Shirts should be made of materials that do not easily ignite or combust, such as polyester. Coveralls should be worn to protect from dirt as well as injury. Coveralls are made from a variety of materials, such as canvas or Tyvek®, which is a tear-resistant, flexible plastic that is widely used to make items practically indestructible, such as postal mailers, banknotes, DVDs, and even housewrap. While canvas is thick, Tyvek® is disposable and lightweight, as well as anti-static, breathable, puncture-resistant, and chemical-resistant. However, it should not be worn near heat or an open flame. Both canvas and Tyvek® provide effective barriers against splashes, asbestos, chemicals, lead dust, and other harmful or irritating substances that can cling to unprotected clothing and be carried inside a home or vehicle.
- **Footwear:** Especially for roof inspections, shoes form the only constant point of contact between the inspector and the roof's surface, and the bond between them needs to be firm. Generally, shoes should have non-slip, non-conducting, flat soles -- ideally, high-traction rubber soles. Footwear such as boots with heels can become caught on an impediment on the ground, a rung on a ladder, or on a roof, potentially causing an inspector to trip, slip or fall.
- **Headwear:** A hardhat should be available for protection from hard or sharp obstructions in areas with low clearance, such as attics and crawlspaces, and under decks and porches. A canvas hat may protect the head from dirt, dust and lightweight debris, and can be used to attach a headlamp to keep the hands free.
- **Gloves:** Insulated rubber or leather gloves should be available for inspecting potentially hazardous electrical components, especially electrical panels, to reduce the chance of electrical shock. Leather, canvas or cotton gloves should be worn to keep hands free of dirt and oily substances, especially while inspecting crawlspaces and basements. A certain amount of crawling on all fours through

these areas will be necessary during inspections, and gloves will certainly make this activity safer. Gloves should fit snugly and have a grippable surface.

- **Eyewear:** Eye protection should be available at all times. Goggles can protect against many types of harmful airborne substances, such as mold spores, sawdust, and insulation fibers. Inspectors should be sure to wear goggles or some other type of eye protection while inspecting electrical panels, which can emit dangerous sparks or arcs. Goggles or safety glasses with optional sideguards and heavy-duty protective lenses (either non-prescription or prescription) are worthwhile investments.
- **Face Mask/Respirator:** A disposable paper face mask that covers the nose and mouth can help filter out mild irritants, such as odors and occasional dust, but they don't offer a tight seal against the face, especially for inspectors with facial hair.



A safer, long-term investment is a respirator. A respirator should be worn in attic spaces, especially where insulation is present. Common types of insulation, such as fiberglass, loose-fill or vermiculite, release tiny particulates into the air when they're disturbed. Just walking through the insulation is enough to disturb it. These particulates are small enough to be inhaled, and, once you inhale them, they can become lodged in your respiratory system. This can create health problems long after initial exposure.

Respirators come in a variety of configurations for different levels of protection, including a half-face respirator, which, like a dust mask, covers the mouth and nose, and a full-face respirator, which covers the eyes, nose and mouth.

A full-face respirator provides greater protection against certain toxins, such as mold and hantavirus, because it protects the mucous membranes around the eyes, as well as the nose and mouth. However, some wearers may find a full-face respirator uncomfortable, and the mask's air filtration mechanism makes it somewhat difficult to breathe freely, especially in warm, enclosed areas where the inspector must crawl and bend using physical movements that may restrict full breathing anyway. There are compelling reasons to opt for maximum protection, but, as with any PPE choice, it depends on the circumstances. A lower-face or half-face respirator can filter out irritants and some pathogens, but offers no protection for the mucous membranes of the eyes.

## Some dangers requiring respiratory protection include the following:

**Histoplasmosis** is a fungal infection caused by contact with bird feces. Symptoms range from none to serious, depending on the health of the person with the disease, and the extent of the infection. It's primarily a respiratory infection, but if it spreads to other organs, it can be fatal.



*There are compelling reasons to opt for the maximum protection that a full-face respirator offers.*

**Raccoon roundworm encephalitis** is a very serious (and potentially fatal) disease that requires a long recovery period. According to the U.S. Centers for Disease Control (CDC), infected raccoons commonly shed millions of roundworm eggs each day in their feces. These eggs can survive for years under adverse conditions. You can become infected by breathing dust in enclosed spaces in which raccoons have been living, such as attics. In parts of the U.S., such as the West Coast, Midwest and Northeast, local



infection rates among raccoons run as high as 80%. In 2003, only 25 cases were reported, but this disease is difficult to diagnose. Of those 25 infected people, five of them died. You may not be able to tell if raccoons have lived in the attic you're inspecting. If you see raccoon scat on the roof or in the attic, mention it in your inspection report.

*This is what raccoon scat looks like.*

## One home inspector who was diagnosed with roundworm encephalitis described his condition:

"Encephalitis is worth worrying about in this business. I got it three-and-a-half years ago. [Symptoms included] wildly varying fever and occasional loss of consciousness. Scared me and my family badly. Creamed my memory, and I am now slightly dyslexic."

**Hantavirus** is another potentially fatal virus that's transmitted through rodent droppings and urine. Inspectors may encounter this danger in a crawlspace or an attic. Infected rodents, especially the common deer mouse, have been found throughout the U.S. Their dried feces can break down into particles so small that they can become airborne, and inhaling the contaminated dust can cause serious health effects. The fever-like symptoms may be mistaken for the common flu, and the incubation period is believed to be up to five weeks after exposure. There is no known cure for hantavirus, which is fatal for at least 30% of the people who contract it and fail to seek immediate

treatment. That's why it's crucial for inspectors to protect themselves from potential exposure in hazardous environments.



*The crawlspace pictured left is in a vacant home that had been occupied by pack rats for two years. The dark areas on the plastic soil cover are feces and urine.*

If you find similar conditions in a home you've been asked to inspect, health and safety considerations dictate that you recommend that the affected area first be addressed by a pest-control professional. Offer to re-inspect it after the rodents have been removed, their point of entry has been blocked, and the area has been chemically treated by a qualified contractor. (Most inspectors charge a re-inspection fee, but that's up to individual inspector.) Read more about hantavirus in InterNACHI's article: [Hantavirus Danger in Homes](#). The Centers for Disease Control (CDC) state that a half-face respirator is adequate for working in an area where there is a danger of hantavirus exposure, although other sources say that a full-face respirator is required. To be safe, it's a good idea to wear goggles to prevent contaminated dust from coming into contact with the eyes if only a half-face respirator is being used.

The following are specific instructions from the CDC concerning appropriate respirators for hantavirus exposure:

*[W]ear either a half-face, tight-seal, negative-pressure respirator, or a positive-pressure, powered air-purifying respirator (PAPR) equipped with N-100 or P-100 filters (formerly designated as high-efficiency particulate air filters [HEPA]). Negative-pressure respirators are not protective if facial hair interferes with the face-piece to face seal because a proper fit cannot be assured.*

Respirators that have HEPA filters are excellent choices in general because, by definition, they trap at least 99.97% of small particulates. Some sort of respiration protection is recommended under all appropriate circumstances, however, because the effects of breathing in certain types of irritants may not be evident until well after the initial exposure.



PPE for one-person and small inspection businesses comes down to personal choice and personal responsibility. Remember to work safely and wear the proper protection when the situation calls for it.

## Inspection Signage

**For Residential Inspections:** When inspecting a residential property, inspectors aren't bound by any legal requirements regarding signage, but that doesn't mean they aren't potentially liable if someone is injured. A lack of adequate notification to clients and

those present on a property being inspected can lead to injuries and lawsuits, and the costs can be devastating to an inspector's business and future livelihood.



To avoid liability and to ensure the safety of all persons present at an inspection, InterNACHI has created compact, lightweight "STOP -- Inspector at Work" signs for inspectors to use on the job site, specifically designed to be placed on ladders, near crawlspace entrances, and at other areas that are being inspected that may hold hazards. Made of strong, durable plastic, these handy signs can stand up on their own and fit snugly over the rung of a ladder, and fold up flat for easy storage and transportation.

These indispensable warning signs may also provide legal leverage for inspectors who are sued for harm suffered by a client during an inspection. They can be ordered online at Inspector Outlet.



**For Commercial Inspections:** When inspecting a commercial property, it is important to recognize certain hazards that may be present. For instance, in active manufacturing environments, signage that identifies hazardous conditions is commonplace. These may include confined spaces and whether they require entry permits.

State and federal requirements for proper commercial signage are fairly comprehensive, but remember that there are other types of commercial environments that inspectors may inspect, including common spaces in condominiums, co-ops and apartment complexes, for which signage is more informational in nature, though some of these will also warn about hazards. Some examples include weight limits for elevators, occupancy loads for restaurants, time restrictions for public pools, temperature limits for saunas, parental supervisory notifications for playgrounds, etc. Regardless of the type of commercial property, be diligent in your inspection process, and consider the possibility that hazards may exist but may not be identified by proper signage.



**For All Inspections:** In addition to explicit signage at the inspected property, some equipment used near the inspector's



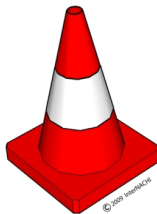
vehicle can indicate an appropriate caution to those nearby. Inspectors may want to consider placing road cones or orange triangles some distance behind their parked vehicles to prevent others from parking too closely behind. Large, unwieldy items, such as ladders, are more safely removed when there is ample room in which to maneuver. Nothing causes tension like a prospective home buyer or real estate agent who gets knocked in the head after parking snugly behind the inspector's truck. Also, as universal symbols of caution, road cones will alert passing motorists and pedestrians of the need to maintain a safe distance. Furthermore, road cones can be used to demarcate a larger inspection area that may present a potential hazard to others.

Additionally, if an inspector is carrying an especially long ladder or other equipment that hangs off the back of his vehicle, state laws require some type of red or orange flag attached to the item to indicate the hazard to drivers following behind.

Where anyone's safety depends on warning them of potential hazards of any type, do not hesitate to make such notification and take adequate precautions. Personal safety and personal liability go hand in hand.

## Tools of the Trade

Home inspectors are actually required to use only a few types of equipment. In theory, an inspector could perform an inspection that complies with the InterNACHI Standards of Practice using only two pieces of equipment: a ladder and an electrical tester capable of testing ground-fault circuit interrupter (GFCI) devices.



However, there is equipment an inspector needs in order to perform inspections safely.

Inspectors should always have with them a basic toolkit that will enable them to perform their inspections competently and safely, as well as help them avoid injury from hazards inherent in their jobs.

Inspectors are free to use whatever equipment they choose, as long as their inspections comply with the InterNACHI Standards of Practice. Here are examples of some of the equipment used by home inspectors. In addition to **road cones** and the indispensable **InterNACHI "Stop -- Inspector at Work" sign** previously noted, here is a list of the most common items found in the home inspector's arsenal:



**Toolkits:**

Although inspectors are not required by InterNACHI's Standards of Practice to disassemble anything, sometimes the removal of a few screws can allow easier inspection of various items, such as furnaces.

**Tool Vest:** Inspectors need to carry a variety of tools while they inspect a home. Flashlights, a moisture meter, infrared thermometer, electrical testers, cell phone, and a mirror are just some of the equipment they commonly carry. A vest allows inspectors to work hands-free and gives them quick access to their equipment.



**Ladder:** Inspectors should bring to every inspection an all-purpose ladder for gaining access to the roof, as well as to inspect higher places in the home's interior. (A special section on ladder use and safety is offered later in this course.)

**Other Roof Inspection Equipment:** Inspectors who must walk on rooftops (especially those who perform roof, wind and hail inspections) regularly risk fall-related injuries. Some equipment that can keep them from stumbling off a roof include fall-arrest systems, and other items, including:

**Roof Shoes:** Shoes form the only constant point of contact between the inspector and the roof, and the bond between them needs to be firm. Some companies make shoes that are specially designed for roof work, but these are not always necessary. The boots pictured at right are made by Cougar Paws™ and really grip the surface. They have replaceable, high-traction soles which are held to the bottom of the boot by Velcro®. Whatever type of shoes you decide to wear, they should be flat and have high-traction rubber soles. Footwear with heels can become caught on roof surfaces, potentially causing the inspector to trip and fall;



**Ladder tie-offs:** Inspectors should bring with them straps to use to attach their ladders to the roof or structure. This attachment will help prevent the ladder from being blown away by a strong wind, embarrassing the marooned inspector. Also, a ladder tie-off can potentially prevent the ladder from slipping away from the building beneath the weight of the climber;

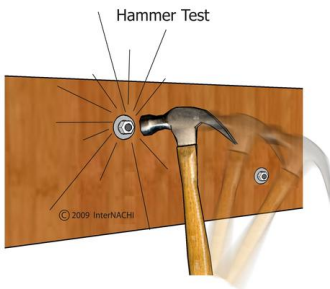
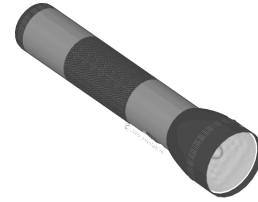
**Personal tie-offs:** Inspectors may want to attach themselves to the roof as an added security measure. A few notes about this procedure:

- Some roofs do not allow for the implementation of this safety measure. Roofs must have a protruding, sturdy, accessible place as a connection point, such as a chimney.
- The strap must have as little slack as possible. Rolling down 15 feet of steep roof and then plunging another 10 feet before being halted in mid-air

is still going to hurt. Plus, the dangling inspector will need to somehow climb back up.

- It is best to attach the strap to a harness designed for that purpose, rather than a tool belt or limb.
- It is dangerous to tie the strap to a car on the other side of the house. While the car might hold the inspector in place during a fall, it would not hold the inspector in place if someone were to drive the car away. A riding lawnmower is also a poor choice for an anchor.

**Flashlights:** Inspectors should bring at least two flashlights with them before entering dimly lit attics and crawlspaces. This precaution will eliminate the possibility that one flashlight will lose power, forcing the inspector to feel his way back out of the area. The multitude of potential dangers that lurk in crawlspaces alone is startling -- from exposed nails and broken glass, to dangerous reptiles, insects and mammals.



**Small Awl or Ice Pick:** This comes in handy for probing for wood decay.

**Hammer:** This can be used to test the tightness of bolts on wood decks and similar structures.

**Tape Measure:** InterNACHI's Residential Standards of Practice and inspector courses require inspectors to accurately report whether overhead clearances are adequate, whether electrical receptacles are spaced adequately, whether baluster infill is too wide, and whether step risers are tall enough, among many other determinations, making a tape measure a must-have item.

**Electrical TIC-Tracer:** This is an inexpensive tool that helps identify live wires and whether panel covers are energized.

**Electrical Testers:** Inspectors use a variety of electrical testers according to their preference and how much they are willing or can afford to spend. Generally, expensive testers identify a wider range of defects than less-expensive testers.

**Electrical Tester (basic):** This type of tester (pictured above) is widely used but indicates only the more common defects. The button is for testing GFCI devices and the three colored lights indicate various defects. It does not test for defective AFCI devices that are often required in certain rooms in new homes. It tests 120-volt electrical receptacles but not 240-volt receptacles. Almost every inspector has one





and many inspectors use only this tester when checking electrical components.

**Electrical Tester (120- & 240-volt tester):** This type of tester (pictured right) tests for the presence of both 120-volt and 240-volt electrical current. It is useful for testing electrical receptacles for dryers when no dryer is installed in the home at the time of the inspection.



**AFCI & GFCI Tester:** This type of electrical tester (pictured left) checks for proper operation of both arc-fault and ground-fault circuit interrupter devices. It is used by some inspectors. The one pictured above is a SureTest Ideal 61-059 Tester.



*The SureTest Ideal 61-165 GFCI/AFCI Tester is pictured right.*

**Voltage Indicator:** This very simple device (pictured above) is used to determine whether voltage is present in a device or in wiring. It has limited accuracy and may give positive readings where no house current is present but where levels of generally harmless static electricity are present.



**Screwdrivers:** Phillips and flat-head screwdrivers with insulated handles should be used for removing screws and covers of electrical panels, cover plates, etc.

A **combustible-gas detector** (pictured right) detects small amounts of combustible gases. Most inspectors use their noses since the most common combustible gases – natural gas and propane – have odors that are easy to detect.



**Moisture meters** come in two types: search and measure. Using the meter in search mode, inspectors can find elevated moisture levels hidden behind a variety of materials, such as tile and vinyl. This feature helps locate plumbing leaks hidden beneath shower and bathroom floors. Using the meter in search mode allows inspectors to find areas with elevated moisture levels but does not provide a

measurement of those levels. Using the meter in



*Moisture meter (above) in “search” mode*



*Moisture meter (above) in “measure” mode*

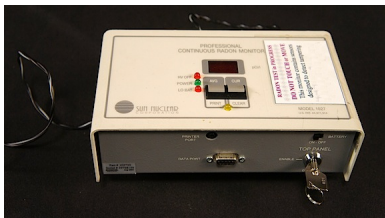
measure mode allows inspectors to actually measure levels in materials by touching the material with the two pins. Some moisture meters have both search and measure features. Most meters have either one or the other. A moisture meter is a useful implement for detecting or confirming moisture inside walls, such as a leak, and where mold growth is suspected. Read more about invasive and non-invasive moisture meters to find out which type is best for you.



**Carbon Monoxide Analyzer:** Carbon monoxide (CO) is a tasteless, odorless, toxic gas produced by combustion appliances, such as water heaters, furnaces and boilers. CO can accumulate in the human body over time to a point at which it can be fatal. Excessive levels can be produced when combustion appliances operate inefficiently and need servicing, or when they are improperly

vented. Analyzers, such as the one pictured above, measure CO levels and give results in parts per million (PPM/ppm).

The digital readout on an **infrared thermometer** tells the temperature of whatever you point it at using an infrared beam. It's used for checking the temperature of heating and cooling equipment, including registers, hot water, etc., and the temperature of electrical equipment, such as circuit breakers. Infrared thermometers are also convenient for checking the temperature of items that are difficult to reach.



A **continuous radon monitor** (pictured above) test for the radon. Radon testing is an ancillary inspection for which clients pay an additional fee. Radon levels in homes vary by area. Some areas have little or no radon, and some can have high levels. Continuous radon monitors sample the air once an hour. At the end of the 48-hour minimum test period, the monitor gives a result

that is the average of all samples.

**Binoculars:** These can be used to observe where physical, up-close access is restricted. The soffit and fascia components of a roof cannot be inspected closely without the use of a ladder or binoculars.

**Magnet:** A magnet can be used to tell the difference between aluminum siding and steel siding, or galvanized steel flashing and copper flashing.



A **microwave tester** (such as the InterNACHI model pictured left) confirms that the magnetron, which

powers the microwave oven, is working. It does not read microwave levels. Some inspectors use them.



A **telescoping magnet** (pictured left) makes it easier to retrieve dropped items, such as screws from the main electrical panel cover.

A **telescoping adjustable mirror** (pictured left) is easy to carry and useful for looking into areas where accessibility is limited, such as behind siding and stucco to confirm the presence of housewrap.



The wick of a **smoke pen** (shown above) produces smoke that shows the movement of air. A smoke pen can be used to check combustion appliances for back-drafting that can pull toxic exhaust gases out of an exhaust flue and into the living space. It might also be used to show that return-air vents are operating properly.



A **compass** (pictured right) is used to determine the home's directional orientation, which can be helpful if the home has energy-efficient features or if the client requests that the home's elevation be described by the direction it faces.

**Safety glasses** are good protection for situations when inspectors may find their eyes or vision at risk. Crawlspace and attics have protruding wires and fasteners. Electrical panels may give off sparks or debris during short circuits.



**Electrical gloves** should have high dielectrical and physical strength. They typically consist of liner gloves under rubber insulating gloves, with protective leather gloves worn over these. InterNACHI recommends that all home inspectors wear electrical gloves that meet ASTM D-120/EIC903 specifications.

**Infrared Camera:** Are you Infrared-Certified®? Remember that you can do more with an infrared camera than simply check for cold spots and energy loss around windows and doors as part of an ancillary inspection service. You can check for insufficient insulation in unfinished attics above ceilings, the soundness and viability of roofs and roof-covering materials, moisture intrusion at the building envelope, and hot spots in electrical wiring. Using an infrared camera for all your standard home inspections can put you miles ahead of the competition. Find out more about IR's capabilities in InterNACHI's articles on





thermal technology.

Inspectors use many other types of equipment because their use allows the inspector to offer an inspection of enhanced value. Moisture meters and infrared cameras are good examples. Both of these pieces of equipment allow inspectors to identify unacceptable conditions that cannot be identified visually. Although not required by the Standards of Practice, some inspectors believe that offering inspections using these tools will allow them to provide a more valuable inspection, giving them an advantage in the competitive inspection business.



## Tools of the Business

Remember that inspector safety and inspector liability go hand in hand, and inspectors need certain tools to protect themselves beyond the actual inspection, as well as to help them make the most of their time. With some basic organization, standard paperwork, and low-cost technology, inspectors can manage their time to their greatest advantage, which, in turn, helps grow their reputation and their business.

These business essentials are as crucial to an inspector's toolkit as the tools he uses during an inspection:

A **Home Inspection Agreement between the Inspector and Client** that is already filled out with the client's basic available information, and which specifies the scope of work, saves time and potential misunderstandings before you commence the inspection. Bring an extra hard copy to leave with the client. The Agreement is also available in Spanish. And don't forget that InterNACHI offers the same standard template through its **Online, Signable Inspection Agreement System**, which allows all parties to manage the inspection paperwork online. This may come in handy for clients who are unavailable to attend the inspection and for others who need copies of such documents (real estate agents, attorneys, etc.).



Always include a copy of **InterNACHI's Residential Standards of Practice** with your contract. In addition to limiting your client's expectations about the scope of work and the items that can be observed during a visual-only, non-invasive inspection, it can prove useful if any legal issues arise after the inspection based on a previously undiscovered defect.



A **fully-charged cell phone** stored with relevant phone numbers will prevent any wasted time and ill will if you're running late, or if your client is not on the premises when you arrive. InterNACHI Founder Nick Gromicko, in his ultimate inspection marketing manifesto, [How to Run a Successful Home Inspection Business Success](#), recommends that you carry two business cell phones: one for ongoing business, and the other

for new business calls.

A **digital camera** for recording various defects is indispensable for creating a comprehensive and professional inspection report. A picture says a thousand words and will help clarify the written descriptions in your report. Photo documentation is also a must for legal protection and liability issues that may arise after an inspection. Digital photos can also be emailed and included in an inspection report that you upload and deliver online.

When it's insufficient to include only digital photos with your inspection report, consider using professionally created **inspection graphics** from the copyrighted InterNACHI Graphics Library. Whether you retrieve the image from InterNACHI's website or download one from the CD available for sale at Inspector Outlet, you can use the images to clarify items in your inspection report that are difficult or impossible to photograph yourself.



**Business cards** supply not only your contact information, but, when attached to a sticky note, provide a heads-up as to your presence and location at a vacant property for real estate agents and other visitors who might arrive after you've begun your inspection. Make sure it has your unique and professional logo created by InterNACHI's Inspection Logo Design Services, which is a free benefit provided to all InterNACHI members.

**Marketing brochures** can be handed to real estate agents who can generate future business for you. Once you have your own logo created, take your business branding to the next level and have your own personalized and professional-looking brochures created by InterNACHI's Inspector Marketing Department, another free service offered to all InterNACHI members. Brochures are a great tool for both marketing and liability purposes because you can describe your services in detail.



InterNACHI's **"Now That You've Had a Home Inspection"** is a value-added giveaway for your clients who can call upon your services at a later date, and help your business through word-of-mouth, especially if it's attached with your business card. This newly updated guide is the ultimate in home maintenance tips, which can keep your clients' properties safe for them as well as for you. "Now That You've Had a Home Inspection" is also available in Spanish.

InterNACHI's **Education Library** of "How To" soft-cover inspection manuals and textbooks are easy to read and easy to carry, and provide a quick reference for all aspects of home inspections, from electrical and mold to wood decks and radon. New guides are being added nearly every month and can be purchased at Inspector Outlet.

## Avoiding Common Back Injuries

Personal safety on the job goes beyond tools and equipment -- it also includes safe work habits. Many inspection-related back injuries can be attributed to poor lifting and climbing techniques, improper ladder use, and falls.

Use the proper procedures and body position when lifting to reduce the risk of injury. Use the proper ladder for the job, and make sure it is safe and secure. Take precautions to eliminate falls.

### Remember to:

- lift with the legs, not the back;
- visually inspect your ladder before using it;
- make sure the ladder has secure footing before climbing it; and
- ensure that the ladder is at the proper angle based on overall height of the climb.



***UNSAFE!***

## Guidelines to Safe Lifting

Lift objects properly. Avoid bending over. Instead, squat before the object to be lifted and use your knees to rise. Protect your hands and feet by wearing safety gloves and safety shoes. Get a good grip and solid footing, bend your knees, and lift with your leg muscles. Reverse the procedure to set a heavy object down.

Reduce weights and forces to a minimum. Reduce the horizontal distance that objects must be moved. Keep all lifting in the middle range between the shoulders and hands when they are at the side of the body.

Carrying heavy, bulky or long objects by yourself may result in a fall. If you must carry something on your own, check your path beforehand, noting any slipping or tripping hazards that should be picked up or avoided. Make sure the object you're carrying is balanced and your grasp is secure before walking. Take your time, particularly on steps and through tight spaces. Watch so that long or large objects don't bump or catch on something and throw you off balance. Carry objects so you can see where you're going. Get help if you need it or save the job until help is available. Don't risk straining your back or falling.

## Remember to:

- lift only what you can handle without over-exertion, and get help, if necessary;
- lift comfortably -- choose the position that feels comfortable and natural;
- lift gradually;
- lift close to the body;
- lift without twisting; and
- maintain tight abdominal muscles.



## High-Risk Lifting Activities

There are several things inspectors do that put them at risk for lower back injury. Standing or sitting for long periods of time, doing tasks that require awkward postures for more than a minute, and activities that require twisting the upper body put a person at risk for back injury. Other activities, such as repeated and sustained extended reaches, bending over, work performed above shoulder-level, lifting and lowering objects heavier than 25 pounds, and pulling and pushing heavy loads for more than 30 seconds also put a person at risk of lower back injury. These activities should be done infrequently, or with adequate help, and/or with rest periods built into the work time.

## Quiz 2

Which statement is correct?

- OSHA has no real jurisdiction over sole-proprietor inspection operations.
- OSHA has jurisdiction over all safety issues in the workplace.

One-person inspection outfits \_\_\_\_\_.

- should be extra-diligent with regard to safety because no one is looking out for the inspector but himself
- are protected by OSHA
- needn't worry about PPE

T/F: Many inspection-related back injuries can be attributed to poor lifting and climbing techniques.

- True
- False

When lifting a ladder, one should always \_\_\_\_\_.

- lift with the legs
- lift with the back
- lift with the arms

Doing tasks that require awkward positioning for more than a minute may contribute to \_\_\_\_\_.

- a lower back injury
- vertigo
- headaches

Inspection contracts should be prepared ahead of time to include the \_\_\_\_\_.

- scope of work
- inspector's credentials
- assessed value of the property

Including digital photos and graphics in an inspection report \_\_\_\_\_.

- all of these
- can clarify reporting language
- can limit the inspector's liability
- allows them to be uploaded into an online report and emailed

T/F: Infrared cameras are good only for finding air leaks.

- False
- True

# Ladder Operation and Safety

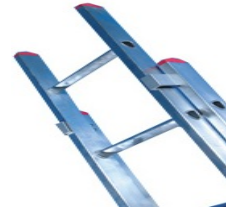
## What Is a Ladder?

This section may seem very basic, but some inspectors may be confused as to terminology and what a particular ladder is in its technical aspects, as defined by OSHA. A ladder is an appliance designed for climbing which consists of two side-rails joined at uniform intervals by cross-pieces, called rungs or steps, on which a person may step to ascend or descend.



## Common Types of Household Ladders

- A **step ladder** is a self-supporting portable ladder, non-adjustable in length, having flat steps and a hinged back.
- A **single ladder** is a non-self-supporting portable ladder, non-adjustable in length, consisting of but one section; its size is designed by the overall length of the side-rails.
- An **extension ladder** is a non-self-supporting portable ladder, which is adjustable in length.



According to the American Ladder Institute, there are officially nine different types of ladders. Not all of them are used by inspectors, however.

### The following ladders are commonly used by inspectors:

- **step ladder.** The step ladder is a self-supporting ladder that is not adjustable in length, with a hinged design for ease of storage;
- **single ladder.** The single ladder is a non-self-supporting ladder that is not adjustable in length, consisting of one section. This type of ladder is rarely used anymore because extension ladders are used instead;
- **extension ladder.** The extension ladder is a non-self-supporting ladder that is adjustable in length. It consists of two or more sections that travel in guides or brackets arranged so as to permit length adjustment;
- **articulated ladder.** An articulated ladder has one or more pairs of locking articulated joints, which allow the ladder to be set up in several different configurations. It may be used as a step ladder or a single ladder; and
- **telescoping ladder.** This ladder uses a pin system to "telescope" into variable lengths. As it is more portable than the extension ladder, it is often preferred over that design for indoor applications. Inspectors should be aware that accidents have happened due to failure of the pins, which can be difficult to detect in advance. Some inspectors refuse to use telescoping ladders for this reason.



# Ladder Injury Statistics

## Statistics Concerning Ladder Dangers

- Based on a study performed by the Home Safety Council, nearly 150,000 Americans were treated for home ladder injuries in 2000.
- According to the U.S. Consumer Product Safety Commission, in 2004, more than 547,000 people were treated in hospital emergency rooms, doctors' offices, clinics and other medical settings due to injuries related to ladder use. Most of the injuries were cuts, bruises and fractured bones.
- According to the World Health Organization, the United States leads the world in ladder deaths.
- Each year, there are more than 164,000 emergency room-treated injuries and 300 deaths in the U.S. that are caused by falls from ladders.
- Additionally, about 50 construction workers are killed by falls from ladders every year.
- Falls from ladders are the leading cause of deaths on construction sites.
- Many workers sustain back injuries from carrying ladders improperly.
- Around twice as many falls occur while going down ladders.
- The main cause of falls from straight and extension ladders is sliding of the ladder base, where the ladder base slips out and moves away from the structure.
- For self-supported ladders or step ladders, the main cause of falls is tipping sideways.
- Most ladder deaths occur from falls of 10 feet or less.
- Over the past decade, the number of people who have died from falls from ladders has tripled.

## Protecting Yourself

Always remember to protect yourself. Your life and safety are worth far more than the price you've charged for the inspection.

## **Follow these basic guidelines when evaluating, purchasing, setting up and using ladders:**

- Choose the right equipment. Properly rated ladders are an important start.
- Ladders should be checked to ensure that they are in good condition prior to every use.
- Choose ladders that are the right height for the job you are performing. Ladders that are too long or too short can be hazardous.
- A sticker on a commercial ladder tells you its maximum weight capacity. Use only Type I, IA or IAA ladders, which can support 250, 300 and 375 pounds, respectively.
- OSHA says job-made portable ladders must be tested for strength, while a conventionally manufactured ladder must be able to hold at least four times its maximum weight capacity.
- Ladder rungs, cleats and steps must be parallel, level and evenly spaced (10 to 14 inches for most ladders).
- The rungs and steps of metal ladders must be grooved or roughened to minimize slipping. Side-rails must be at least 11-1/2 inches apart.
- Never tie ladders together.
- If you use two or more ladders to reach one spot, they must have a platform or landing between them.
- Ladder parts must be smooth to prevent punctures, cuts and snagging of clothing.
- Wooden ladders must not be painted with a coating that can hide defects.
- Employees must be trained in ladder use. This is particularly important if you work for or own a multi-inspector firm.

## **Safety Tips for Inspectors and Homeowners**

### **Never:**

- leave a raised ladder unattended. Ladders that are not in use should be laid on the ground or put away. A client may be tempted to climb the inspector's raised ladder if it is left unattended, which is never a good idea. Similarly, the inspector should never use the client's ladder;
- place a ladder in front of a door that is not locked, blocked or guarded;
- use a ladder for any purpose other than the one for which it was designed;
- tie or fasten ladders together to provide longer sections, unless they are specifically designed for that purpose;
- use a ladder in windy conditions;
- exceed the maximum load rating. The maximum load rating, which should be found on a highly visible label on the ladder, is the maximum intended load that the ladder is designed to carry. Duty ratings are Type III, II, I, IA and 1B, which correspond to maximum load capacities of 200, 225, 250, 300



and 350 pounds, respectively. Inspectors and homeowners should know the duty rating of the ladder they are using, as well as the combined weight of themselves and their tools;

- use a step ladder in the closed position;
- sit on any rung, including the top;
- climb past the fourth rung from the top on leaning ladders, or the second rung from the top on step ladders;
- pull, lean, stretch, or make any sudden movements. Over-reaching is the most common and dangerous form of ladder misuse; or
- step on the rear section of a step ladder or the underside of an extension ladder.

## **A reminder about tie-offs:**

Inspectors using ladders to inspect the exterior of a home should bring with them ladder tie-offs, which are straps that attach their ladder to the roof or other parts of a structure. This tie-off will help prevent the ladder from being blown away by a strong wind, stranding (and embarrassing) the marooned inspector. Also, it will secure the ladder from potentially slipping away from the building beneath the weight of the climber.

As a further precaution during a roof inspection, inspectors may want to attach themselves to the roof using a personal tie-off. A few notes about this procedure:

- Some roofs do not allow for the implementation of such a safety measure. The roof must have a protruding, sturdy and accessible place as a connection point, such as a chimney.
- The strap used for the personal tie-off must have as little slack as possible. Rolling down 15 feet of steep roof and then plunging another 10 feet before being halted in mid-air is still going to hurt. Plus, the dangling inspector will need to somehow climb back up.
- It's best to attach the strap to a harness designed for the purpose, rather than use a toolbelt or limb.
- It is dangerous to tie the strap to a car on the other side of the house. While the car might hold the inspector in place during a fall, it would not hold the inspector in place if someone were to drive the car away. A riding lawnmower is also a poor choice for an anchor.

## **OSHA's Requirements for Ladders**

**The following are OSHA's general guidelines for ladder construction, configuration and usage:**

- Portable step ladders longer than 20 feet shall not be used.

- Step ladders shall be equipped with a metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in the open position.
- Single ladders longer than 30 feet shall not be used.
- Extension ladders longer than 60 feet shall not be used.
- Ladders shall be maintained in good condition at all times.
- Ladders shall be inspected frequently, and those which have developed defects shall be tagged or marked "Dangerous" or "Do Not Use" and removed from service for repair or destruction.

Proper use of ladders is essential in preventing accidents. Even a good ladder can be a serious safety hazard when used by workers in a dangerous manner.

## **OSHA standards require the following safety precautions for ladder use:**

- Ladders shall be placed with secure footing on a level surface when possible, or they shall be tied off at the top, middle and bottom to prevent slipping.
- Ladders used to gain access to the roof or other area shall extend at least 3 feet above the roof. This provides a point of support when stepping onto the roof.
- The foot of a ladder shall have a horizontal distance from the top support to the foot of the ladder of one-quarter of the working length of the ladder. To accurately determine this distance, divide the length of the building from the ground to the top support by 4.

## **Additional Information:**

- The worker shall always face the ladder while climbing up and down.
- The worker shall use both hands while climbing and descending a ladder.
- If the top of the ladder is at 16 feet, and the ladder extends to 20 feet, the base should be 4 feet from the building.
- The base of the ladder should be placed so that it is 1 foot away from the building for every 4 feet of height to where the ladder rests against the building. This is known as the "4-to-1 Rule."
- Short ladders shall not be spliced together to make a longer ladder.
- Ladders shall never be used in the horizontal position as scaffolds or work platforms.
- The top of a regular step ladder shall not be used as a step.
- Metal ladders shall never be used near electrical equipment.

## Ladder Sizing and Ratings

TYPE	DUTY RATING	WORKING LOAD
IA	Industrial	Extra-heavy: 300 lbs. maximum
I	Industrial	Heavy: 250 lbs. maximum
II	Commercial	Medium: 225 lbs. maximum
III	Household	Light: 200 lbs. maximum

Overall Length	Maximum Working Height
16-foot ladder	13 feet
24-foot ladder	21 feet
28-foot ladder	24 feet
32-foot ladder	29 feet
36-foot ladder	32 feet

Use a ladder of proper length to reach the working height required. Choose a ladder according to use and working load, which is the combined weight of the climber and the load being carried.

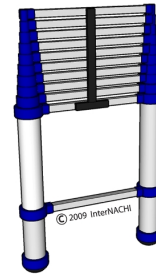
### Things to Remember:

- The bottom of the ladder should be 1 foot away from the wall for every 4 feet that the ladder rises. For example, if the ladder touches the wall 16 feet above the ground, the feet of the ladder should be 4 feet away from the wall.
- If you are going to climb onto a roof, the ladder should extend 3 feet higher than the roof. The upper and lower sections of an extension ladder should overlap to provide stability.
- Before using a step ladder, make sure it is fully open, and the spreaders or braces between the two sections are fully extended and locked.
- Whether inside or outside the house, do not place step ladders or utility ladders on boxes, countertops, or unstable surfaces to gain additional height.
- The highest standing level on a step ladder is two steps from the top.

## A Word About Telescoping Ladders:

This type of ladder has become quite popular within the past few years. Ensure that the ladder is rated for its intended use.

Using a telescoping ladder correctly relies on following the manufacturer's instructions for deploying it, including fully extending it, extending it by sections, and securing the mechanisms properly.



Retracting a telescoping ladder without using extreme care can lead to injuries to the fingers, hands or feet. Inspectors have reported pinching their skin when they weren't paying attention to what they were doing.

Usefulness and convenience of storage and transport are never excuses for choosing, using or deploying any tool or device without proper training and attentiveness. These types of ladders are no exception.

Inspection of these ladders requires an understanding of all interlocking mechanisms, telescopic effects, ratings, and safe ascending and descending practices.

## Inspecting a Ladder

Ladders should be inspected before each use. Your safety depends on it.

In cases where a multi-inspector firm is the user, it is advisable to have routine ladder evaluations performed by one who is knowledgeable and competent. Maintain records of such inspections. The inspector should check the ladder for damage before each use. If a ladder is damaged, label it. Do not use it until it has been repaired or replaced.

OSHA says that a ladder must be inspected regularly by a competent person for visible defects and after any incident that could affect its safe use.

Ladder Inspected	_____
	(Date)
Next Inspection	_____
	(Date)
Ladder Inspected By	_____
	(Name)



## Here are some guidelines for portable ladders:

- All ladders shall be inspected at least twice yearly, and prior to each use.
- If a ladder tips over, inspect it immediately for side-rail dents or bends, or excessively dented rungs; check all rung-to-side-rail connections; check hardware connections; check rivets for shear.

- All wooden parts should be free from splinters, cracks and decay. Metal ladders should be inspected for dents that would compromise the structural integrity of the ladder.
- All ropes and pulleys shall be in good condition and absent of wear, burrs, splinters and fraying.
- Joints between the rungs and the side-rails should be tight. Rungs should not move when twisted by hand.
- All hardware and fittings should be securely attached.
- All moveable parts should operate freely without binding or undue play. Lubricate, if necessary.
- Safety feet at the base should be sound and unbroken.
- Rungs/steps should be free of grease, oil, and any other substance that would make them slippery. Wooden ladders having oil or grease on standing and/or gripping surfaces should be steam-cleaned to remove the substance. Under no circumstances should corrosive or alkali materials be used to remove grease or oil, as these may compromise the structural integrity of the ladder. Rungs/steps on metal ladders must be corrugated, knurled or coated with a slip-resistant material.
- No rungs/steps may be missing.
- Step ladders should have a metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in an open position.
- The spreader should not have any sharp objects protruding from it.
- No ladder should be painted or coated with any material that may cover up obvious defects.

## **Before mounting a ladder, always check the following:**

- That the ladder is free of oil, grease, wet paint, and other slipping hazards;
- That the feet work properly and have slip-resistant pads. These pads become worn over time and may need to be replaced. On extension ladders, the rubber pads can be turned around to reveal metal spurs, which can be used to secure the ladder on soft surfaces, such as grass or dirt;
- That rung locks and spreader braces are working;
- That all bolts and rivets are secure;



- That the steps, rungs, and other ladder parts are free of oil, grease, and other materials;
- That the ground under the ladder is level and firm. Large, flat, wooden boards braced under the ladder can level a ladder on uneven or soft ground. Also, some companies make leveling devices so that ladders can be used on uneven and hilly terrain;
- That ladder rungs, cleats, or steps are parallel, level, and uniformly spaced when the ladder is in position for use. Rungs should be spaced between 10 and 14 inches apart;
- That the ladder is anchored. The base can be tied to a nearby sturdy object, such as a pole or a building. If no anchor is available, a stake can be driven into the ground. Inspectors should beware not to anchor their ladders to something that can impale them if they were to fall on it, such as a grounding rod. A 10-inch nail, hammered so as to leave only 1 or 2 inches exposed, is usually safe and effective;
- That the area around the ladder is roped off or barricaded. An "InterNACHI Inspector at Work" stop sign can also be placed beside the ladder to warn others to stay clear;
- Any indications of cracks, bends, splits or corrosion;
- The location of nearby power lines. If setting up a ladder near them or other types of electrical equipment is unavoidable, use a wooden or fiberglass ladder. Do not let a ladder made from any material contact live electrical wires;
- The distance of a non-self-supporting ladder from the structure. This type of ladder must lean against a wall or other support, so it should be positioned at an angle such that the horizontal distance from the top support to the foot of the ladder is about one-quarter the working length of the ladder. A rough method to test this angle is by placing your toes at the base of the ladder and stretching your arm at shoulder-height. Your hand should just touch the ladder;
- That the ladder has slip-resistant feet;
- That the ladder is the proper length for the job. Ladders should extend a minimum of 3 feet over the roofline or working surface;
- Locking devices. Step ladders must have a metal spreader or locking device to hold the front and back sections in an open position when in use; and
- That someone knows where you are. Accidents can and do happen in remote areas where cell phones are ineffective and no one is home. If you are injured under these conditions, no one will know you are hurt and need help.

# Setting Up and Using a Ladder

## Here are some basic rules regarding ladder placement:

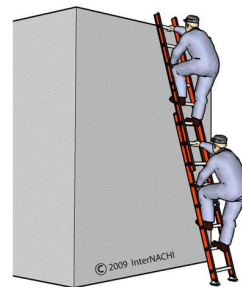
- Make sure the ladder is dry before using it.
- Place the ladder on level ground and open it completely, making sure all locks are engaged.
- Remember to use the 4-to-1 Rule for extension ladders. That is, for each 4 feet of distance between the ground and the upper point of contact (such as the wall or roof), move the base of the ladder out 1 foot.
- Always wear slip-resistant shoes, such as those with rubber soles.
- Face the ladder while you are climbing up and down, and keep your body centered. You can gauge your position by your belt buckle, if you wear one. If your buckle passes beyond either ladder rail, you are over-reaching and at risk for falling.
- Stand at or below the highest safe rung. For a step ladder, the safest rung to stand on is the second from the top. For an extension ladder, it's the fourth rung from the top.

## Remember these guidelines for safe ladder set-up and use:

- Whenever possible, it's best to use two people to carry and set up a ladder. Since many inspectors are one-person operations, this may not be practical. Then it becomes especially important to ensure that the ladder chosen for use is not too heavy or difficult to move, that it's properly rated, in good condition, and is easy to set up.
- Keep all types of ladders (and tools) at least 10 feet away from live power lines, connections, cables and equipment.
- Set the ladder on firm, level ground. Use ladder levelers on uneven ground.
- When setting it up, be sure to secure the ladder by tying it down, using slip-resistant feet, and/or by having someone hold it in place for you.
- Keep the area around the top and bottom of a ladder clear. In passageways, doorways, and where there is



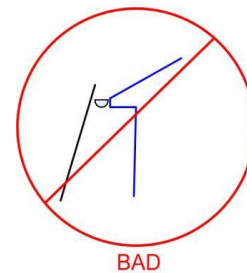
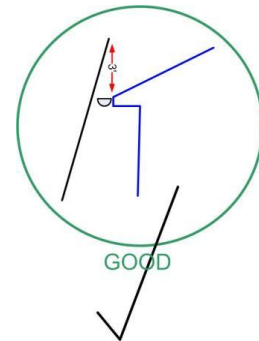
**UNSAFE!**



**UNSAFE!**

traffic or other activities, try to secure the ladder, or limit access to the immediate area while you're working.

- Do not set a ladder on a scaffold, box, or any other object.
- When using a step ladder, remember that all four of its legs must be on solid, level ground. The spreaders must be fully open and locked. Step ladders should not be climbed when closed and leaning against a wall.
- When using an extension ladder, always remember that the ladder base should be 1 foot from the building (or top support, such as an eave) for every 4 feet of ladder length up to the resting position. Counting rungs will give you a good estimate of the ladder's length; rungs are approximately 1 foot apart.
- Some ladders used by inspectors are a hybrid of step and extension ladders. Whatever mode the ladder is in, the proper setup and safety guidelines should be followed.
- When using an extension ladder, be sure to lock the top section in place. Extension ladder sections must actually overlap by approximately 3 feet for ladders up to 32 feet.
- Both rails should rest evenly where set, on both the top and bottom.
- When a ladder is used to get on and off a roof, be sure to secure the ladder by tying it off. The side-rails should extend at least 3 feet above the roof to be safe.
- If you have to step around a ladder because of rungs, there should be a grab-rail attached to the building to help you. (OSHA requires both a grab-rail and a tie-off if a ladder doesn't extend at least 3 feet above the roof.)
- When working on flat roofs, if there is a high parapet wall, use a stairway or some other way to gain safe ladder and roof access and egress.



## While on the ladder, always:

- Consider anchoring the top of the ladder with a bungee cord. Perhaps the most feared move an inspector must make is stepping back onto the ladder from the roof. He must step around the section of the ladder that extends above the roofline, placing lateral pressure on the rung as he makes contact with the ladder. A bungee cord is a convenient tool that can be used to reduce any movement that could otherwise result in a serious accident. Also, a bungee cord may prevent the ladder from being blown over in the wind while the inspector is on the roof;
- Face the ladder. Be conscious of the ladder's location, especially while walking on the roof. In an emergency, the inspector may need to leave the roof quickly. A ladder becomes much more dangerous when an inspector gets covered in a swarm of stinging bees and must get down in a hurry, for instance;

- Keep your body centered between the rails at all times. Do not lean too far to the side while working; and
- Utilize three points of control because this minimizes the chances of slipping and falling. At all times during ascent and descent, the climber must face the ladder and have two hands and one foot, or two feet and one hand, in contact with the ladder. In this way, the climber is unlikely to become unstable if one limb slips during the climb. It is important to note that the climber must not carry any objects in either hand that can interfere with his firm grip on the ladder.

## Three-Point Control for Climbing Ladders

When it comes to ladder safety, there's a difference between three-point control and the traditional three-point contact rule. Three-point control is a climbing method that involves always using three or four limbs distributed over three or four locations for reliable support. Three-point contact involves simply coming into contact with the ladder at three points without necessarily requiring a reliable hand grip for support. Three-point contact is sometimes referred to as the three-point stance, an American football term used to describe the stance of a lineman with two feet planted in and one hand in contact with the ground.

Critical to three-point control is grasping the ladder so that one hand can bear the full weight of the body, if needed, and distributing the climber's weight among three or four rungs. The three-point control method distributes the climber's weight among three or four rungs, which is safest. If one foot slips during a foot transition, two hands should be grasping the ladder rungs to support the body weight. If either foot slips during a hand transition, the climber's weight can be supported with a hand and a foot. If both feet slip during a hand transition, the climber's weight is transferred to one or both hands.

## Demonstration

The images below show the safe climbing method: grasping the rungs, rather than the side rails; having only one limb on one rung at a time; and moving only one limb at a time. The image at the left shows the climber using both hands to grasp, with both feet in



contact with the ladder rungs. The image in the center shows him using both hands to grasp and one foot to transition. The image on the right shows him making contact with one hand to transition while both feet are in contact with the ladder rungs.

Whenever there's a risk of a serious fall, three-point control should be used because it helps decrease the likelihood that a person will lose control when an unexpected slip or loss of balance occurs.

## Traditional Method

The traditional method of climbing a ladder consists of:

- keeping the belly button between the two side rails;
- two hands holding a ladder rung or side rail; and
- one foot on a ladder rung.

The main problem with the traditional method for climbing a ladder is that the hand grip strength is inadequate to hold onto a side rail to support the entire body weight in order to prevent a fall (Young, Wooley, Armstrong, et al., 2009). It is safer for an inspector to grab a horizontal rung rather than a vertical side rail.

## Horizontal Power Grip

Holding a ladder rung or horizontal bar is referred to as a horizontal power grip (Barnett & Poczynok, 2000). To help prevent an uncontrolled fall, one hand must grasp a horizontal support using a horizontal power grip at all times. Grip control in contrast with contact is critical. Side rails or vertical holds provide a contact hand grip based mostly on friction. The horizontal power grip has a 75% to 94% larger breakaway force than when gripping a vertical rail (Young, Wooley, Ashton-Miller, et al., 2012).

## Vertical Side Rail

Based on a recent study at the University of Michigan funded by the Center for Construction Research and Training/NIOSH, neither men nor women can support their full body weight through the use of only one hand gripping a vertical side rail (Young, Wooley, Ashton-Miller, et al., 2012).

The hand that is gripping the ladder side rail will, in a fall, slide down and hit the next ladder rung 12 inches below in a quarter of a second. It takes about a third of a second for a human hand to respond and fully grasp an object. Therefore, the climber's hand will hit and pass the ladder rung before the climber has the muscle response to fully grasp and attempt to stop the fall (Robinovitch, Normandin, Stotz, et al., 2005; Thelen, Schultz, Ashton-Miller, et al., 1996).

Three-point control is not three-point contact. Ladder users may increase their personal safety by using the three-point control method in addition to following the other accepted ladders safety standards.



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Consider the following when climbing a ladder:

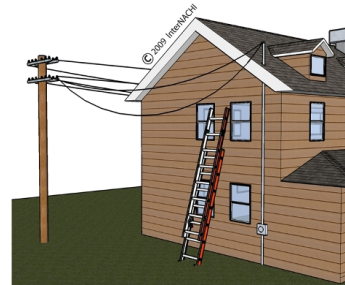
- Properly stage the ladder according to standards.
- Grasp the horizontal ladder rungs and not the vertical rails.
- Use the horizontal power hand grip.
- Grasp, rather than simply make contact.
- Distribute your weight among three or four locations.

## Ladders and Electricity

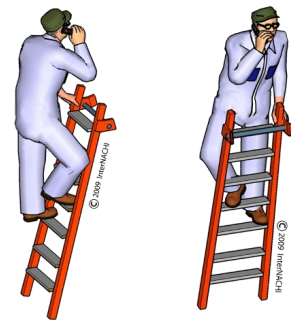
Nearly everyone uses ladders to reach objects on pantry and closet shelves, and to wash windows, hang drapes and pictures, and clean gutters. Ladders are so useful and commonplace that they are often taken for granted. Sometimes, people fail to recognize inherent hazards outdoors, such as getting too close to or coming into actual contact with electrical power lines. The same is true for home inspectors. We use ladders at buildings so regularly that we often overlook basic safety procedures. We become so comfortable with what we are doing that we often work in an unsafe manner, never thinking of the consequences.

Here are some simple rules to remember when working in proximity to electrical lines:

- Keep all ladders and other tools in a "safe zone," at least 10 feet away from any power lines.
- Never use metallic ladders around power lines.
- Never count on a power line to be insulated, no matter what it looks like. Some utility power lines may be partially damaged or not completely insulated.
- Don't count on a wooden or fiberglass ladder to protect you from electrical shock. Wet and even dirty ladders can conduct electricity.
- Before you move a ladder, check the area carefully for power lines or other electrical equipment. Pick a safe route to carry the ladder to the work area, and then carry it horizontally--never upright.
- Put it up only where you have to work. Always make sure that if the ladder were to fall, it would not come into contact with any power lines or other electrical equipment.
- When you're on a ladder, your balance and control may be compromised for various reasons. Be careful with every movement you make. Remember that distances can be deceiving from the top of a ladder.



**UNSAFE!**



**UNSAFE!**

## Review

- Always check the ladder for moisture and damage before using it.
- Always face the ladder when climbing it.
- Wear shoes with slip-resistant soles.
- Always maintain 3-point contact, such as one hand and two feet, or two hands and one foot, while climbing up and down.
- Keep your body centered between the side-rails of the ladder so you don't tip over.
- Never work from the top step of a step ladder, or from any of the top three steps of a straight or extension ladder.
- If you must work from an extension ladder, consider using a fall-protection system attached to a secure anchor point on the building, especially if pushing, pulling or prying. Remember to keep both feet on the same rung.
- Do not hold objects in your hand when moving up or down or stepping on or off a ladder to an upper level. Attach objects to your tool belt, or pull them up on a line after you get to your work spot. Since most inspectors rely on tools, such as a camera, screwdriver, awl, moisture probe, etc., it is important to remember to keep both hands free while climbing a ladder.
- Do not use a ladder outdoors when it is windy.
- Ensure that the base of the ladder is on a firm and level surface.
- Lower the top section of an extension ladder before you move it.
- To avoid back and other injuries, remember to use safe lifting techniques while unloading your ladder from your truck, while transporting it to different areas of the property, and when reloading it back onto your vehicle.
- One of the more obvious hazards is setting up a ladder too close to power lines. Before using a ladder outdoors, choose a location that is well away from all power lines, including service heads, aerial cables and drop wires. No metal ladders should be used around live electrical cables.

## More Do's and Don'ts When Using a Ladder

- Before climbing a ladder, make sure the locks are secured and the bottom and top of the ladder rails are on firm surfaces.
- The soles of your shoes should be clean so they don't slip off the ladder rungs. Don't wear leather-soled shoes, which can be slippery. This recommendation is significant, as many inspectors wear leather-soled shoes while examining electrical panels and equipment. Make sure that shoelaces are tied. Ensure that pant legs are not so long that they extend under your heels, potentially causing you to slip.
- Maintain a 3-point contact when climbing and descending a ladder.
- Do not lean over either side of the ladder.
- Never stand on the top rung of any ladder.



***UNSAFE!***

- Don't over-reach; it's safer to move the ladder to a new location when needed. Climb down and re-position the ladder.
- Don't overload a ladder; it is meant to be used by only one person at a time.
- Do not use any ladder if you tire easily, are subject to fainting spells, or are using medication that makes you dizzy or drowsy. Of course, never use alcohol if you're going to use a ladder.

## Ladder Inspections

Remember that OSHA says a ladder must be inspected regularly for visible defects by a competent person, as well as after any incident that could affect its safe use. Again, since many inspectors are one-man operations, he should inspect the ladder before each use. In the case of multi-inspector firms, it is advisable to have routine ladder evaluations performed by one who is knowledgeable and competent. The inspector should check the ladder for moisture and damage before each use. If the ladder is damaged, label it as such. Do not use it until it has been repaired or replaced.

For the home inspector, the rules of ladder safety should become second-nature.

## Quiz 3

A non-self-supporting portable ladder, non-adjustable in length, consisting of but one section is called a(n) \_\_\_\_\_.

- single ladder
- extension ladder
- step ladder
- folding ladder

The chief hazard when using a ladder is \_\_\_\_\_.

- falling
- ladder collapse
- slipping
- pinching
- electrocution

According to OSHA, portable step ladders longer than 20 feet \_\_\_\_\_.

- shall not be used
- must have a Class III rating
- must be made of fiberglass
- must be made of wood
- must have a Class II rating



- must be made of metal

Anyone using a ladder should \_\_\_\_\_.

- always face the ladder when climbing up and down
- keep one hand free at all times
- wear leather-soled shoes

The base of a ladder should be placed so that it is 1 foot away from the building for every \_\_\_\_\_ feet of height to where the ladder rests against the building.

- 4
- 3
- 5

T/F: The main cause of falls from straight and extension ladders is sliding of the ladder base, where the ladder base slips out and moves away from the structure.

- True
- False

T/F: Tipping sideways is the main problem with self-supported ladders or step ladders.

- True
- False

A Type-IA ladder supports a maximum of \_\_\_\_\_.

- 300 pounds
- 375 pounds
- 250 pounds
- two people

According to OSHA, ladder rails must be at least \_\_\_\_\_ apart.

- 11-1/2 inches
- 1 foot
- 11 inches
- 2 feet

T/F: Damaged ladders may still be used, provided they are properly labeled as to the extent of the damage identified.

- False
- True

If a person is going to climb onto a roof, the ladder should extend \_\_\_\_ feet higher than the roof.

- 3
- 2
- 4

A 24-foot ladder has a maximum working height of \_\_\_\_ feet.

- 21
- 22
- 23

T/F: Wooden and fiberglass ladders will always protect a person from electrical shock.

- False
- True

The "safe zone" represents a distance of \_\_\_\_\_ feet from any power lines.

- 10
- 5
- 15

## Roofs

### Inspecting Roofs & Risk Factors

According to the InterNACHI Standards of Practice, inspectors are not required to walk on any sloped roof surface. Inspecting the roof through binoculars from a vantage point on the ground, from a ladder at the roof edge, or from a window or balcony are all acceptable methods.

Still, many inspectors feel compelled to walk roofs because they believe that without viewing the roof closely, they may miss defects that will cost their client money -- and damage the inspector's reputation. Secondly, inspectors who walk roofs believe that it gives them a business advantage over their competitors who don't walk roofs.

It is true that without walking roofs, inspectors can miss defects that are difficult to see from a distance or that are located on portions of the roof that are not visible from the positions mentioned above.



*This house in Boulder, Colorado has a very steep roof.*



*Old slate, like that pictured above, will break when stepped on.*

Despite this, there are roofs that inspectors should not walk for a variety of reasons:

- The roof is too steep/high. The maximum slope that is safe to walk depends on the type of roof-covering material, its condition, and the weather at the time of the inspection.
- The roof is too fragile. The roof covering may be made of a relatively fragile material, or the roof-covering material may be old and brittle; or
- The roof is too slippery. This may be due to the nature of the material or the presence of microbial growth on the roof surface, such as moss or algae. Some materials can be walked safely when dry but are slippery when wet. The roof pictured below would be virtually impossible to walk because of its slope, and more so if it were wet.

## Walking the Roof

You will always do a better job of inspecting a roof if you walk it. There's no substitute for being able to get a close look at the entire roof. Sometimes, roofing materials need to be touched to be properly evaluated.



If you do decide to walk the roof, in order to do so safely, the roof should be dry. You should wear soft-soled, high-traction footwear. Crepe-sole boots are a good choice, and so are sneakers with soft, rubber soles. You can also use roof-walking boots, such as those pictured below, which have replaceable soles that attach with Velcro®.

## Different Types of Roof-covering Materials & the Risks of Walking Them

### Asphalt Composition Shingle



Asphalt composition shingle roofs offer good traction, even when wet. As they age, these shingles become somewhat less safe to walk because the asphalt granules become loose. Shingles with advanced deterioration can crumble when walked on. Microbial growth, such as moss and algae, will cause shingles to become slippery when wet.

## Clay and Concrete Tile

Tile does not offer good traction, although concrete tiles generally have a rougher surface and offer better traction than clay. This is especially true if the tile is wet.



*Easily walked when dry, concrete tile can be too slippery with even a light covering of snow.*



*This roof would be considered borderline in terms of whether it can be safely walked.*

How fragile tiles are varies with tile profile, and its thickness and condition. Flat and low-profile tiles break less easily than high-profile tiles. Tile breakage is a concern because a tile that breaks while being stepped on can cause an inspector to lose his balance or start sliding. Clay tiles can erode and become thinner and so they may be more fragile than older concrete tiles. Both concrete and clay tile can be dangerously slippery when their surface has accumulated microbial growth.

Generally speaking, concrete tiles can be walked without breaking if the proper method is used, but clay tiles should not be walked on. An in-depth discussion of the proper methods for walking concrete tile roofs lies beyond the scope of this course.

## Wood Shakes and Shingles

Wood shake and shingle roofs provide relatively good traction as long as they are dry and free of microbial growth. Wet wood roofs become slippery, and wet wood roofs with surfaces covered with microbial growth are extremely slippery and dangerous, and should not be walked.



## Metal Roofs

Metal panel roofs are typically smooth but can be walked if the roof is low-slope at 3:12 or less. Steep-slope metal roofs become increasingly dangerous to walk as the slope becomes steeper. Once an inspector starts to slide on a metal roof, regaining traction is difficult. Wet metal panel roofs are slippery, dangerous and should not be walked.



Although they are manufactured in different gauges, metal shingles are typically hollow and much more fragile than metal panel roofs that have a solid bearing against the underlying sheathing.

Walking metal shingles without damaging them requires more skill and care than walking metal panel roofs. Smooth shingles become slippery when wet. They are sometimes coated with mineral granules that improve traction, but unless an inspector is familiar with the particular type of metal shingle, as well as confident of his ability to walk it without creating damage, it is best to stay off metal shingle roofs.

## Slate

Slate roofs are fragile and expensive to repair. They become softer and break more easily as they age and are dependent on fasteners to hold them in place. Fasteners corrode over time and may fail when the slate tile is stepped on. Some slates develop a powder film over time that can be slippery even when the slate is not wet. Inspectors should stay off slate roofs.



## Composite Slate

Composite slates are those not split from slabs of stone but are manufactured from a variety of other materials, including plastic, rubber, fiber-reinforced cement, extruded concrete, clay, or particles of limestone or slate. Some composite slates become increasingly brittle as they age and are impossible to walk on without damaging. Some types of polymer-based composite slates provide good traction as long as they are warm, but they become slippery very quickly once they are shaded. Inspectors should test composite slate carefully before walking on it.



*The bowed tiles indicate that this is a composite-slate roof.*

# **SAFETY FACTORS**

In deciding whether or not to walk a roof, the ability to accurately evaluate it is a skill that can be developed and improved with study and practice. There's no formula, and a number of things have to be taken into consideration. Materials and conditions are different on different homes, in different parts of North America, and at different times of the year.

Inspectors should make an effort to learn about the materials and conditions they're likely to encounter in their service areas. Some of the important things to consider in deciding whether to walk a roof are personal risk-tolerance, the roof's slope, its exposure, the condition of the roof-covering materials, and the safety equipment available.

There are no firm rules or standards that apply to every inspector regarding the maximum slope that can be safely walked for each of these roof-covering materials.

In deciding whether to walk a particular roof, an inspector should consider the following factors.

## **Roof Factors**

A roof's condition regarding its safety for walking include the:

- roof-covering material type and condition;
- roof exposure. In this context, "exposure" means danger. Roofs that are especially high, steep, or that have landscaping features on the ground below its edge that represent a potential danger can be considered high exposure. An example of a difference in the danger represented by landscape features is a wrought-iron fence as compared to a hedge that could help break a fall; and
- weather conditions. In addition to precipitation, wind -- especially gusty winds -- can affect the inspector's safety when walking a roof.

## **Inspector Factors**

Experience plays an important part in walking roofs. As they gain experience, inspectors will better understand the conditions under which walking a particular roof-covering material is safe, and they will develop better judgment in determining when changing conditions cause a roof to become increasingly unsafe to walk.

Also, with growing experience, inspectors become more confident in their ability to walk roofs. Confident inspectors are more relaxed when walking roofs. Body tension is detrimental to a person's sense of balance, so when inspectors are relaxed and confident, they have a better sense of balance and are safer while walking roofs.



The third factor related to individual inspectors is their physical condition and reflexes. Inspectors who are flexible, agile, and who have quick reflexes will be better able to respond to slipping or to wind gusts, and are more likely to be confident in their abilities.

The fourth factor is a fear of heights. Most inspectors initially have this fear to some degree and gradually lose it as they gain experience and confidence. Retaining some fear is healthy, however, because it helps prevent inspectors from becoming over-confident in their abilities and potentially careless. Over-confident inspectors may over-estimate their abilities, which can get them into serious trouble.

Some inspectors never lose their fear of heights, and these individuals should limit their efforts to walking only roofs within their level of confidence. Generally speaking, if an inspector is not comfortable walking a roof, he should stay off it. An inspector should never let a client, an agent, another inspector, or anyone else pressure him into walking a roof that he feels is unsafe. Inspectors who take unreasonable chances are risking their own well-being, that of their families, and anyone else who will be affected if the inspector is injured or killed.

## Slope

As a rule, steep roofs are more dangerous to walk than flatter roofs, but even low-slope roofs can be dangerous.

Damp, moss-covered wood roofs and shingles, and especially metal roofs, can be slippery enough to cause you to slide right off even a low-slope roof.

The type of roof-covering material installed should be taken into consideration when looking at the slope. For example, on a warm day, a roof with a slope of 6:12 covered with asphalt shingles might be relatively easy to walk, but a roof of the same slope covered with smooth, metal roofing would be much more dangerous.

Here are the typical maximum slopes walked by inspectors who are comfortable on roofs:

- asphalt shingles: 8:12 for single-story homes, and 6:12 for two-story homes;
- wood roofs: 6:12; and
- metal roofs: 5:12.

## Roof Boots

High-traction boots are available that are made specifically for walking roofs. They have soft, replaceable rubber soles and provide good ankle support.



## Gaining Access to the Roof

Once you've decided to walk a roof, you'll have to decide how best to gain access. One way is by climbing out a window.



This can be the safest method, since it eliminates ladder-climbing, but you'll need to be careful not to damage screens, walls or window trim.

You may also be able to access the roof from a deck or balcony, either by climbing over the rail onto an adjacent roof slope or by setting up a ladder.

## Fall-Arrest Systems

Fall-arrest systems provide protection for anyone working on or inspecting a roof. Various forms of safety equipment are available, and guidelines are used to ensure they are installed and used properly.

More than 6 million people work at approximately 250,000 construction sites across the United States every day. Inspectors are likely to find fall-arrest systems at these locations, as well as in residences, where homeowners (or hired professionals) use them while doing roof work to replace a vent, fix a leak, or evict a family of squirrels, for instance. People on roofs fall as a result of unstable working surfaces, misuse or failure to use fall-protection equipment, and human error.



Specifically, fall-arrest systems are used to assist anyone working on or inspecting a roof in the following ways:

- They reduce the likelihood of serious injury or death associated with a fall. The injury (or death) of a worker may financially ruin the contractor through lawsuits and lost work.
- They reduce the need for outdoor railings and scaffolds, which get in the way of the job, and provide only incomplete protection by themselves.
- They reduce the time required for construction and repairs, as well as the associated costs. Workers who are protected are not as concerned with fall avoidance, allowing them more freedom to concentrate on the job.



The Occupational Safety and Health Administration (OSHA) requires some form of fall-protection system where workers are at risk of falls of 6 feet or more. This may include a safety net, guardrail, or fall-arrest system. Work performed from scaffolds, pump jacks and ladders are subject to different safety rules. OSHA monitors construction sites – commercial and residential -- to ensure compliance with their safety standards. Depending on factors such as the severity of the violation and the size of the contracting company, violators may be fined up to \$70,000 for non-compliance.

## Fall-Arrest System Elements

These include:

- roof anchors. These metal devices are attached to the upper part of the roof rafter or ridge board, where they clamp the safety cable or rope in place. Various types of anchors are available, and they each have different requirements. Some require sheathing and some do not; some are disposable and some are reusable. Their prices vary with quality. Installation requirements are as follows:
  - Manufacturers recommend placement every 8 to 10 feet, and about 6 to 8 feet from gable ends. These distances are intended to prevent the possibility that the worker will swing like a pendulum if he or she falls.
  - Workers should also stay within a 30-degree arc of either side of the anchor point. On most houses, this equals approximately 5 to 6 feet.
- Restraints. These ropes or cables may be made from materials such as polypropylene or polyester. Some ropes are self-retracting, meaning they automatically withdraw from a housing unit as a worker moves away from the unit. Inside the housing unit is a brake that activates in case of a free-fall. These systems are generally expensive yet easy to use because slack rope does not interfere with work.
- Lanyards. These synthetic webbing devices connect the lifeline to the rope-grab mechanism. They are available in sizes from 1 to 3 feet (though they should never be longer than 3 feet), and may come with or without a shock absorber.



Fall protection starts with an anchoring point into which a lanyard can be clipped. An anchoring point is typically a ring attached to a metal strap that can be nailed to the roof.

## **The Rojen Roof Safety Pole®**

The Rojen Roof Safety Pole® is a vertical pole designed to stop construction workers from falling off roofs on construction sites. Invented by Australian Bob Richards, the device has been tested and certified as an anchor point in accordance with AS1891.4.



The pole is a telescoping aluminum rod that extends approximately 4 feet (1.3 meters) above the roof. The cable that extends from the shaft is designed like a car seatbelt in that it reels in and out with ease unless it is pulled sharply, in which case it will brake. The safety pole itself is designed to withstand an impact of 2.1 tons. Two models are available:

- the temporary tradesman's model; and
- the vent pole model, which provides permanent roof anchorage, and also functions as the building's sewer gas ventilation pipe.

## **General Safety Practices**

The following are general guidelines that should be followed by inspectors walking a roof:

- Avoid dirt and debris that can cause you to lose your footing. Be careful to avoid tracking dirt on your shoes from the ground onto the roof.
- Mark off the area below you to let people know you are working, such as by using an InterNACHI "Stop -- Inspector at Work" sign. It is very easy to drop a tool!
- Never attempt to mount a steep or high roof if you are not a professional. Lifelong disabilities and death happen more often than you think.
- Never mount a roof while it is windy, raining, or when the roof is otherwise wet.
- Secure power tools that are not being used with ropes or bungee cords. It is helpful to keep all tools in a large bucket suspended from the roof.
- Wear shoes with good traction -- preferably, roof shoes that are designed for the purpose.

## **Alternatives to Walking a Roof**

There are roofs that, for one reason or another, you will not walk. Almost any roof can be examined from the rooftop but, sometimes, that examination requires measures that exceed the scope of the general home inspection.

When a roof has special inspection requirements, you may need to make arrangements to meet a roofing contractor at the property. This might be the case with an especially high roof needing a very long ladder. It might require placing ladders to climb especially steep

roofs, or it might require fastening sheets of plywood across the surface of especially fragile roof-covering materials.



*The tripod extends up to 35 feet. Some are available that extend up to 70 feet.*

These measures exceed InterNACHI's Standards of Practice. The Standards specifically exempt inspectors from having to walk roofs at all, but many inspectors walk roofs anyway, both because they're comfortable doing it and because they believe that it provides their clients with better service. It can also give them a business edge over their competition who don't walk roofs.

Some inspectors don't think they're giving their client a full inspection unless they walk the roof. The fact is, you're performing a general home inspection. In most situations, your inspection of the different home systems will not be as complete as a specialist inspection. Just as you won't be pulling a furnace apart to get a good look at the heat exchanger, you won't be laying tall ladders across very steep roofs, or suspending plywood across very fragile roofs. That's a specialist inspection.

If you're qualified, you can offer specialist inspections as ancillary services, but you should understand where to draw the line between what you provide in a general home inspection and what constitutes an ancillary inspection. If you are using methods and equipment that are usually used by a roofing contractor but not by a home inspector, you're performing a specialist inspection.

The bottom line is: To perform a home inspection according to the Standards of Practice, you are not obligated to walk a roof. You have alternatives.

## Inspecting Using Technology

Inspector Outlet offers its Spectroscope, a special 28-foot telescoping pole that integrates its tripod-mounted camera with your own smartphone, allowing you to see high-definition digital images as you photograph them.



*...a remote-controlled video camera mounted*



*Spectroscope integrates with your smartphone to take digital images.*



*Inspector Outlet's Spectroscope allows you to view the digital camera images above on your smartphone below. The Spectroscope mounts on 6-foot sections so that you can customize its height up to 28 feet.*

## Recommending a Specialist

It is not necessary to walk roofs to be successful in the home inspection business. If an inspector feels that a roof is not safe to walk but believes that it cannot be adequately inspected from the ground, by using a ladder at the roof's edge, or from some other vantage point, he should recommend further evaluation by a specialist. A qualified roofing contractor has access to specialized equipment that allows him to safely and closely inspect roofs that are dangerous or may be damaged by inspection using the conventional methods described in this section.

## Quiz 4

T/F: Inspectors are required to walk roofs of 3:12 or less.

- False
- True

The only unacceptable reason to decline walking a roof is because \_\_\_\_\_.

- the inspection is taking too long
- the roof is covered with slate tiles
- the roof is too steep
- the roof is covered with wet metal panels

T/F: It is always possible to adequately inspect a roof without walking on its surface.

- False
- True

Hollow metal shingles may resist damage from walking to different degrees depending on their \_\_\_\_\_.

- gauge
- exposure
- length
- fasteners

\_\_\_\_\_ is/are not a safety factor to be considered when deciding whether to walk a roof.

- The original cost of the roof-covering material
- How fragile the roof-covering material is
- The condition of the roof-covering material
- Weather conditions at the time of the inspection



The inspector should walk a roof only if \_\_\_\_\_.

- s/he considers it safe
- the client insists
- the roof is dry
- the client and his/her agent both insist

## The Exterior

### Asbestos As a Popular Building Material

Asbestos cement is a composite material consisting of Portland cement reinforced with asbestos fibers. When manufacturers figured out ways to produce siding made using asbestos cement, it became very popular for a number of years before being banned in the U.S. in the 1970s. InterNACHI inspectors are likely to come across this form of exterior cladding during inspections. Inspectors and homeowners alike can benefit from knowing more about how the known health risks of asbestos apply to asbestos cement siding, too, as well as some of the common problems and issues associated with the material's damage and deterioration.

In the 1920s, the National Board of Fire Underwriters recommended that asbestos cement replace wood as siding and roofing material because of its superior fire-resistant properties. During the late 1960s and early '70s, however, the news media began to report on the health hazards associated with asbestos. As reports increased, concern grew, so the federal government took action and, in 1973, the U.S. Environmental Protection Agency (EPA) banned the use of asbestos in the manufacture of building products.



### Health Risks Associated with Asbestos Cement

Asbestos fibers are a proven health hazard if inhaled. Asbestos dust is a known cause of a type of lung cancer called asbestosis. Mesothelioma, another deadly form of cancer that attacks internal organs, can also be caused by exposure to asbestos. However, asbestos cement siding that has been properly installed and is not in a state of decay presents no health risks as long as it remains undisturbed. This is because the cement

binds the asbestos fibers and prevents their release into the air, under normal use and maintenance.

The EPA deems asbestos to be hazardous when it is in a friable state, meaning that it can be crumbled, crushed or pulverized by hand pressure. Crushed asbestos in a powdery form consists of particles small enough to become airborne and inhaled, causing potential health problems. Asbestos cement products that are not in a friable state are not considered hazardous. The only potential danger is when the cement is disturbed in a way that causes the asbestos fibers to become airborne.

If mechanical activities performed on the siding, such as chipping, sawing, grinding or sanding, allow particles to become airborne, then the cement is considered in a friable state and, consequently, hazardous. Deterioration can also lead to particles becoming airborne and potentially dangerous.

## Inspection Tips

Here are some common problems associated with asbestos cement siding that inspectors are likely to encounter:

- Chipping and cracking often occur with this brittle material.
- Fasteners used to hold the siding in place may deteriorate at a faster rate than the siding.
- Discoloration and staining may occur from corrosion or runoff from an adjacent material. The discoloration may be normal, but it could also indicate a chemical reaction that has decreased the durability of the material.
- Like many other cement products, efflorescence may appear on asbestos cement siding. This crystalline growth can indicate that water is passing through the material, promoting deterioration of the cement.
- Biological growth, such as moss and algae, can occur if conditions are favorable. This growth may stimulate surface deterioration and staining.

Because it was such a popular cladding material for many years, inspectors are likely to encounter asbestos cement siding when inspecting exteriors. Knowing some of the health risks associated with this material can be useful when answering clients' questions about asbestos, although any specific concerns should be deferred to the appropriate healthcare professional. Inspectors should always wear the appropriate PPE while inspecting asbestos that has been disturbed.

## Lead Paint Hazards

Lead is a poisonous metal that was once commonly used in the manufacture of paint, gasoline, and plumbing. While U.S. law has banned the use of lead in new construction, existing lead-based paint and plumbing in homes may



present a significant health hazard, especially for children. Inspectors who are not trained in lead detection should not perform lead inspections. They can, however, learn the basic facts about lead so they can answer questions from concerned clients.

## **Where around the home is lead likely to be found?**

- in soil. Even if lead paint has been removed from exterior walls, chips may have made their way into the soil. Also, lead may have been deposited from car exhaust many years ago when gasoline contained high concentrations of lead.
- in dust. Dust can become contaminated in a number of ways, often from soil that makes its way into the home or from lead paint that has been disturbed.
- in plumbing and tap water. Some older houses still have lead plumbing. Even in houses that have copper pipes, lead solder was often used to bond these pipes together.
- in older paint. In 1978, lead-based paint was banned in the United States. Still, homes constructed after that date may have used lead-based paint that had been warehoused.

## **Symptoms of Lead Poisoning**

Lead poisoning is characterized by an enormous variety of symptoms that are sometimes hard to recognize because they are symptoms of other conditions, too. Some symptoms include:

- irritability;
- poor muscle coordination;
- nerve damage;
- cognitive impairment;
- reproductive damage;
- coma; and
- death.



**RRP Training Course  
NAT-RV-I-61589-1-EL**

## **Inspection Tips**

Inspectors who suspect that the property they're inspecting has lead paint that has been disturbed should wear the appropriate respiratory protection, as well as coveralls, gloves and a hat to prevent exposure to contaminated paint chips and lead paint dust.

Inspectors can also consider taking InterNACHI's EPA-approved Lead Safety for Renovation, Repair and Painting course. This course was developed to train inspectors and contractors on how to work safely in housing with lead-based paint and comply with the EPA's Renovation, Repair and Painting (RRP) Rule, as well as HUD's Lead-Safe Housing Rule.

If the property has older lead piping, this is an unsafe condition and should be reported. Lead pipes can be identified by their dull gray color and they can be easily



scratched by keys and coins. Boiling lead-contaminated water will not make it potable; in fact, the hot water will absorb more lead. Only cold water should be used, and only after the tap has been running for a minute or two to clear the line of any flecks or flaking. Local and state health departments can be consulted for testing lead levels in the water supply.

## **Heating Systems**

### **Gas-Fired Combustion Appliances**

The scope of this section is limited to the safety of the inspector during the inspection of the heating system. It is not meant to cover in any detail the proper inspection methods of various heating systems.

The primary danger from heating systems is related to their fuel source. This may be a gas, such as propane or natural gas, heating oil, or electricity.

Gas-fired combustion appliances are heating appliances that produce heat through combustion using natural gas or propane as a fuel. Typically, these are furnaces, boilers and water heaters.

### **Pre-Ignition**

The most serious danger to persons inspecting gas-fired combustion appliances is pre-ignition.

“Pre-ignition” is a strange term, considering that ignition is actually delayed. Upon receiving a call for heat from the thermostat, gas flows into the burn chamber, but, for a variety of possible reasons, ignition is delayed, so when ignition finally takes place, an excessive amount of gas has accumulated in the burn chamber, resulting in an explosion.

The resulting explosion may be small and contained within the burn chamber, or if enough gas has accumulated, the flame may roll out into the room. If an inspector is on his knees looking into the burn chamber to evaluate the condition of the burner flame, the result can be singed hair and eyebrows, or worse. The bodily harm from the ignition explosion can range from injury to the ears or one's hearing due to exposure to the loud noise, a concussion, or being burned.

Compounding the potential danger is the fact that it is not unusual for the occupants of a home to store flammable, toxic substances in containers near combustion appliances. These substances can ignite, causing a fire to spread rapidly and exposing the inspector to toxic materials and smoke.

Inspectors should allow gas to flow no longer than 10 seconds without ignition before shutting off the appliance with the electric kill switch. Once the electrical supply is shut

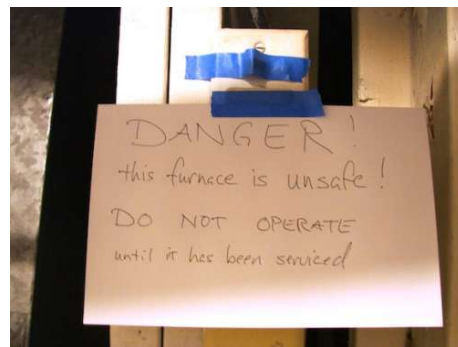
off, the gas supply should be shut off. If the appliance has no kill switch (as water heaters typically do not), or if the switch is inaccessible or hidden, the inspector should shut off the flow of gas at the in-line valve located in the fuel pipe next to the appliance. Gas can often be shut off at a dial on the thermocouple. Inspectors should use whatever shut-off method is safest and fastest.

After shutting down the appliance, the inspector should tag the appliance with a note stating that the appliance has been shut down for safety reasons and should not be operated until it has been certified by a qualified HVAC contractor or technician.

## **Here is an eyewitness description of an actual incident with a furnace:**



*"Strong sewer gas odor from a sewage ejector pump with a rusty lid located in the floor about 6 feet away from a gas-fired furnace masked the smell of natural gas leaking from the furnace. A tag on the furnace stated that it had been certified by a local HVAC contractor just the day before. I turned up the thermostat, went back into the basement, and flipped on the kill switch, and there was a quick flash as gas in the air ignited."*



*"I shut the furnace off using the kill switch and the gas shut-off valve, taped the switch to the 'off' position, and left a note taped over the switch. Apparently, because the note didn't look official enough and the furnace had been inspected recently, upon arriving home, the occupant removed the note and the tape and turned the furnace back on."*

Because the explosion was immediate upon turning on power to the furnace, this incident was probably not due to pre-ignition but from a leak from a gas line, possibly combined with sewer gas accumulation in the mechanical room, which measured approximately 8 feet by 8 feet.

To avoid a similar situation, inspectors should carry with them official-looking notices, preferably with a red background. Before leaving the inspection, inspectors should do their best to notify all parties involved in the transaction about the problem, including the buyer and their agent, and the seller and their agent.



## **Here is an eyewitness account of pre-ignition with a boiler:**

*"I was present when an HVAC technician was testing an older gas-fired boiler. Although ignition was delayed for approximately 40 to 50 seconds, the technician turned to walk out of the basement mechanical room but didn't shut down the boiler. As he opened the door and began to walk through the doorway, the gas ignited. The resulting explosion blew the front cabinet cover off with great force, bouncing it off the side of the open door opposite the technician. Both our ears were ringing, and the air was filled with dust and small bits of paper, which were floating slowly down toward the floor. The sheet metal cover measured about 24 inches by 30 inches and definitely had the power to injure anyone it hit."*

### **When possible, shut off the power first.**

To avoid such dangers from pre-ignition, whenever possible, inspectors should shut off power to the appliance before turning up the thermostat. This is not always possible because with some thermostats, shutting off power to the appliance also shuts off power to the thermostat. When this is the case, the inspector should be diligent in proceeding to the appliance directly after turning up the thermostat.

## **Gas-Fired Wall and Floor Heaters**

In mild climate zones in some older homes, wall or floor heaters may be the primary heating system for a home's individual rooms. The problems related to gas-fired wall heaters are typically due to lack of service. Neglected heaters are notorious for producing excessively high levels of carbon monoxide. However, the short-term danger to inspectors is generally limited to being burned by an overly hot face panel. Floor heaters are less common but their main hazard is also hot surfaces.

## Do Not Operate Gas Valves

Inspectors who find gas valves off should leave them off.

In one incident involving a floor heater, the propane was shut off at a valve located behind a lower panel. The buyer's agent wanted to test the heater, and when the inspector declined to operate the gas valve, the agent's husband (a contractor) opened the valve. The pilot failed to light and the valve became stuck in the "open" position. Propane flowed into the room for about 10 minutes, after which the contractor was able to close the valve and stop the flow. The heater was near a door, so with the doors and windows open, gas did not accumulate to a dangerous level. If this were to happen in a small room with little ventilation, a spark from a light switch or other fixture could have ignited the accumulated gas.



## Oil-Fired Combustion Appliances

Oil-fired combustion appliances are also relatively safe to inspect. Furnaces and boilers are the most common. The main concern related to inspector safety is fire. If the burner fails to ignite the heating oil when the thermostat calls for heat, the system will automatically shut down. A reset button must be activated before another attempt can be made to operate the system. With each activation of the reset button, more heating oil is pumped into the burner. If a significant amount of heating oil accumulates in the burner due to repeated unsuccessful attempts, when the burner finally ignites, a fire can result. Heating oil fires can be difficult to extinguish.

A number of failed attempts followed by a successful ignition is not unusual in systems needing service. If an oil-fired combustion appliance fails to respond to the call for heat, the inspector should not reset the system but should note in his report that the system failed to respond, recommend servicing by a qualified HVAC contractor, and move on with the inspection.

## Electric Heating Systems

There are various types of electric heating systems. They all use electricity to transfer heat by the following three ways:

- radiation;
- convection; and
- forced air.

## **Electric Hot Water Systems**

There are electric boilers that are used as the main heat source. Electric boilers are compact and insulated, with heating elements immersed in the water of the boiler. Inside the compact electric boiler unit are all of the components, including the expansion tank, pump, valves and controls.

Electric water heaters are common in North America. Typically, they are not dangerous to inspect unless they have exposed electrical wiring.

## **Electric Forced Warm-Air Heating Systems**

At an electric forced warm-air heating system, heated air is forced through to the rooms and spaces of the building by the use of a blower fan and ducts or pipes. They have zero clearances. They can be installed horizontally or vertically. Inside the electric furnace is at least one coiled resistance-wire heating element. When there is more than one coil, the coils are activated sequentially, one by one, to prevent an electrical current overload. There is a high-temperature control installed in the unit. The furnace is controlled by a thermostat. A blower fan is installed to force air through the heating elements.

## **Electrical Radiant Heating Systems**

A common type of electrical radiant heating system is one that has a cable embedded in the floor, wall or ceiling. The heat that is created by the cable is transferred to the occupants and surfaces in the room by low-intensity radiation. There are three types of radiant panel systems:

- radiant floor panel systems;
- radiant wall panel systems; and
- radiant ceiling panel systems.

## **Electric Baseboard Heating Systems**

Electric baseboard heating units are usually installed at the floor level and around the outside perimeter of each room or space of the building, particularly below windows. An electric baseboard is made of a heating element protected by a thin metal housing. Heat is transferred into the room primarily by means of convection. Some radiation is involved. A thermostat could be mounted on a wall or the thermostat could be built into the unit. Air moves across the electric baseboard and heat is transferred from the heating element to the air. Electric baseboard heating systems are the most commonly used type of electric heating.

In testing older baseboard heaters during the cooling season, inspectors should remember to turn heaters off before leaving the inspection because there is a chance of starting a fire if a heater malfunctions.

## Heat Pumps

A heat pump is an electrically powered system that has a reversible-cycle refrigeration system that is capable of both heating and cooling the interior air of a building. The heat source is either air (as in air-to-air heat pump systems) or water (as in water-to-air heat pump systems). The most common type for residential installations is the air-to-air heat pump system.



*Obviously, exposed electrical wiring is a dangerous*

These systems are all relatively safe to inspect. They are controlled by a thermostat mounted either on a wall or on the face of the heater. It is possible that people who are not qualified to work on these systems could leave an energized conductor in contact with a metal portion of a heater with which an inspector could come into contact.

## Quiz 5

Pre-ignition happens when gas flowing into a combustion appliance ignites \_\_\_\_\_.

- too late
- too early
- during the purge cycle
- contaminated gas

When starting a combustion appliance, an inspector should allow gas to flow for no more than \_\_\_\_\_ seconds before shutting down the flow of gas or the electrical system.

- 10
- 5
- 15
- 20

The safest and fastest method for shutting off a combustion appliance if the gas fails to ignite in a timely manner at start-up is by using the \_\_\_\_\_.

- kill switch

- gas valve
- thermostat
- thermocouple

If a combustion appliance suffers dangerous pre-ignition or fails to ignite at start-up, the inspector should \_\_\_\_\_.

- shut it down, tag it, and notify those involved in the transaction
- clean the ignition device and try again
- turn up the thermostat and turn on the kill switch simultaneously
- preheat the thermocouple, and then turn up the thermostat

T/F: In order to avoid problems with pre-ignition when starting a combustion appliance, whenever possible, the inspector should shut off power to the appliance before turning up the thermostat.

- True
- False

Multiple resetting of an oil-fired combustion appliance can result in \_\_\_\_\_.

- a burner fire
- a short-circuit of the control board
- soot accumulation on the contact points
- emission of flammable gases

T/F: An inspector should activate the reset button of an oil-fired combustion appliance no more than twice.

- False
- True

# Electrical Systems

## PPE for Electrical Inspections

The most dangerous part of an electrical inspection, and one of the most dangerous parts of the inspection process, is inspecting the interior components of electrical panels. The potential hazards include electrical shock, electrocution, fire, burns, and eye injury from flying debris. The scope of this section is limited to discussing the common electrical conditions likely to be encountered by inspectors during an inspection that represent a danger primarily to inspectors, rather than to the home's occupants.



To more thoroughly recognize and understand the dangers and a wide variety of proper and defective conditions, especially to a home's occupants, inspectors should complete the more comprehensive InterNACHI Residential Electrical Inspection Course.

## Risk Exposure When Inspecting Electrical Panels

Although amperages are typically higher in main panels, both main and sub-panels contain energized conductors of potentially lethal amperage. The level of personal risk to an inspector decreases as his level of knowledge increases. In other words, the more you know, the safer you'll be.

### PPE

Personal protective equipment (PPE) for inspecting electrical panels consists of safety glasses, footwear with rubber soles, and gloves. Simply knowing about PPE doesn't keep inspectors safe. They need to gather the equipment and make sure it's in the vehicle when heading out for an inspection. At the inspection, the gear doesn't protect anyone if it's still in the vehicle. The inspector needs to make a habit of wearing the gear.



### Safety Glasses



*Safety glasses must be impact-resistant.*

### Boots



Wearing footwear with rubber soles while inspecting electrical components is always a good idea. If you must stand in a wet area to inspect an electrical panel at the exterior, you should definitely wear boots with rubber soles.



## Gloves

Electrical gloves are made of rubber and are rated according to the maximum voltage for which they provide protection. The category most appropriate for home inspectors is 00, which provides protection up to 500 volts AC. The gloves in the photo above are rated 00. Proper fit is important for maintaining dexterity. Leather gloves offer some protection but are not as safe as electrical gloves. Rubber-palmed fabric gloves are the least protective.

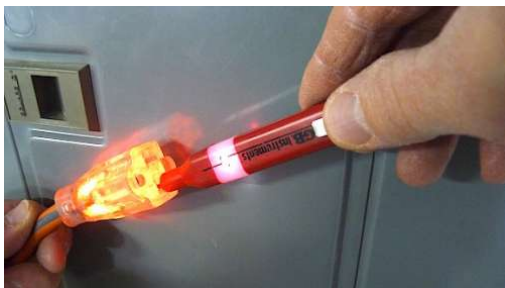


Inspectors performing commercial inspections should consider the increased protection provided by other categories:

- Class 0: Maximum-use voltage of 1,000 volts AC; proof-tested to 5,000 volts AC.
- Class 1: Maximum-use voltage of 7,500 volts AC; proof-tested to 10,000 volts AC.
- Class 2: Maximum-use voltage of 17,000 volts AC; proof-tested to 20,000 volts AC.
- Class 3: Maximum-use voltage of 26,500 volts AC; proof-tested to 30,000 volts AC.
- Class 4: Maximum-use voltage of 36,000 volts AC; proof-tested to 40,000 volts AC.

## Using a Voltage Detector

The first exposure to potential danger can happen by coming into contact with the metal panel—and they are all metal. It's possible for an energized conductor inside the panel to come into contact with the metal box so that the entire panel becomes energized. When this occurs, the panel's exterior surface is hazardous to touch.



Before touching a panel, the inspector should first test it with a voltage detector. These devices are inexpensive, small enough to conveniently carry, and easy to use. You may hear them called by a variety of names, such as a voltage sensor or sniffer, or a TIC tracer. These devices can be used to determine whether the surface of an electrical panel is energized.

A voltage tester will generally not detect voltage if:

- the wire is shielded.
- the operator is not grounded or is otherwise isolated from an effective earth ground.
- the voltage is DC.

The tester may not detect voltage if:

- the user is not holding the tester.
- the user is insulated from the tester with a glove or other materials.
- the wire is partially buried or in a grounded metal conduit.
- the tester is at a distance from the voltage source.
- the field created by the voltage source is being blocked, dampened, or otherwise interfered with.



Upon finding an energized panel, the inspector should abandon the idea of inspecting the panel, post a warning tag in a conspicuous location nearby, and do his best to warn all those involved in the transaction as soon as possible that a dangerous condition exists, and recommend both in the written report and verbally that the condition be corrected immediately.

## Removing Panel Screws

Once it has been determined that the panel's surface is not energized, the next step is to remove the screws securing the cover or dead front. This can also be dangerous. Screws manufactured for securing dead fronts have shallow-cut, closely spaced threads, which reduces the chance that the threads will cut through the insulation protecting the wires as the screws are withdrawn. However, it's not uncommon for the original screws to be lost and for improper types of screws to be substituted.



In the two photos above, you can see the difference between the finer threads on the screw from a Square-D panel and the more deeply cut, widely spaced threads of a typical

coarse-thread screw. The risk of cutting through the insulation that protects the wire conductors may be greater with the threads along the shaft of the screw than with the point of the screw.

If a typical coarse-thread screw is used instead of a screw designed specifically for use at a dead front, when that screw is withdrawn, it may trap a conductor against the side of the enclosure or the back of the dead front, increasing the chances that the screw threads will cut into the insulation, bringing the energized wire into contact with the grounded metal panel. This can shock any inspector not using an insulated screwdriver, as well as cause an arc flash and explosion, which can send bits of metal flying through the air at high speed. Inspectors not wearing eye protection can suffer serious eye injury or permanent blindness. This type of accident can also result in serious burns.



*The photo above shows (from left to right) a proper dead front or panel cover screw, along with three improper but commonly used screws, including a particleboard screw, a gold deck screw, and a machine screw.*

InterNACHI recommends that inspectors not attempt to remove improper screws but, instead, disclaim conditions inside any affected panels and recommend correction by a qualified electrical contractor. Home inspection fees are not lucrative enough for an inspector to justify taking serious risks, and when improper screws have been used to secure the dead front, the odds that something bad will happen are significantly increased.

## **Shutting Off the Main Disconnect**

The common practice among inspectors is to inspect main panels with all branch circuits energized, but they have the option of turning off the power to the main bus using the main disconnect in panels that have an integral main disconnect. This will shut off power to the circuit breakers and the branch-circuit conductors, reducing the chance of an arc

flash caused by a screw cutting the conductor insulation, but inspectors should note that the service entrance conductors will still be energized. In panels with a remote disconnect, shutting off the disconnect will shut off power to the entire panel. The same is true for sub-panels fed by a disconnect located in a main panel.

The disadvantage of shutting off the power to the circuit breakers is that any electronic devices in the home that are connected to the affected circuits will suffer power interruption. Computers may lose unsaved information, clocks will need to be reset, etc. With so many different types of electronic devices available, identifying all the potential problems is difficult or impossible.

Inspectors who intend to shut off power to the branch circuits should get permission from the home's occupant prior to starting the inspection. Even with the occupant's permission, problems may arise due to the inability of the occupant to anticipate them.

Inspectors should develop their own policies and should do so only after developing a solid understanding of the dangers involved. Knowledgeable inspectors should establish policies based on their comfort level with opening panels containing energized components.

Inspectors operating multi-inspector firms may need to view this issue from a different perspective, especially if they are responsible for developing protocols that will be followed by each employee. The electrical inspection skills and comfort levels of employees may vary considerably. In an effort to impress an employer, employees may not always be truthful in describing their skill levels.

## Removing the Dead Front

The dead front should be removed carefully, both to avoid contact with energized electrical components and to avoid tripping any breakers or knocking them loose from the main bus bar.



*Carefully remove a dead front or panel cover.*



Tripping breakers is not necessarily a safety issue, but shutting off a circuit to the home when it's not expected may make the occupants very unhappy, depending on what devices are connected to that circuit, such as computers with unsaved data.



*FPE Federal Pacific electrical panel (Credit: InterNACHI member David Nasser)*

Some brands of panels have a reputation for tripping when they are not supposed to or detaching from the main bus bar easily. Zinsco, Sylvania and Federal Pacific are some examples. They are easily recognized by their colored circuit-breaker handles.

Knocking a circuit breaker out of the main bus bar is a safety issue. To replace the breaker, an inspector will have to reach into the panel. While both gripping the breaker to replace it and pressing it into place, the inspector's fingers will be very close to the branch-circuit conductor's connection points on the breaker, as well as to the main bus bar, both of which will be energized. There is no good choice in this type of situation. Leaving the breaker dangling

from the branch-circuit conductors will prevent replacement of the dead front, and this represents a dangerous condition to the home's occupants, so inspectors should not do this.

Reconnecting the breaker to the bus bar means reaching into the panel, which is not a good option, but it can be made reasonably safe if the inspector is wearing gloves that provide adequate protection if accidental contact is made with energized components. Reaching into the panel will be safer if the main disconnect is used to shut off power to the main bus bar. This may still create unhappy occupants, but replacing the breaker will be safer. If it is a sub-panel with no main disconnect, there should be a circuit-breaker in the main panel that can be used to shut off power to the sub-panel.



*A circuit breaker hangs from its conductor.*

It's much better to avoid this situation by exercising care when removing the dead front.

## Inspecting the Panel Interior

Once the cover is off the panel, many energized components are exposed to touch. Inspectors should not insert anything into the panel that can conduct electricity, including fingers and metal tools.

There are two reasons that inspectors may be tempted to reach into a panel. One reason is to move the conductors aside in order to read and photograph the label that lists the amperage rating of the enclosure.

Another reason is to confirm the size of the entrance conductors, or the conductors feeding sub-panels. The printing on these conductors is sometimes difficult to see due to their position on the side of the conductor facing away from the inspector, or because of dust accumulation on the insulation.

Inspectors should resist the temptation to reach into the panel. Accidents involving contact with energized electrical components can be serious or even fatal. Instead, inspectors can comment in their inspection report that they were unable to safely retrieve information, such as the entrance conductor or panel amperage ratings. This is perfectly acceptable and not at all unusual.



*These labels are often affixed to the side of the panel and are partially obscured by conductors.*



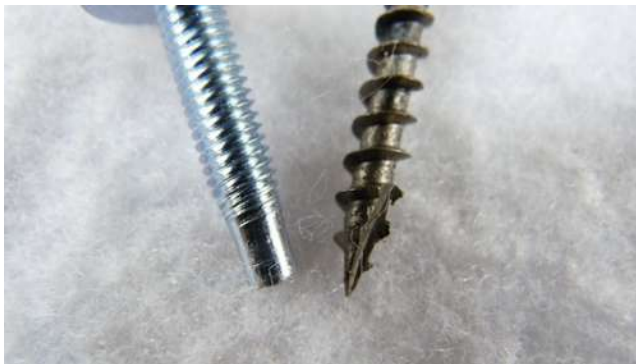
One of the hazards of pushing conductors aside is that, due to a loose connection or a break in the insulation protecting the wire conductor, moving the conductors may cause an unprotected wire to come into contact with grounded components, such as the grounding bus bar or the metal panel itself. This can cause an explosive short circuit, similar to that described in the section on removing panel screws.

When an inspector is accompanied by someone who may not be aware of the dangers associated with touching exposed, energized electrical components, such as a client, agent, homeowner or occupant, that person may be tempted to point to an item in the panel that is being discussed, such as a defect of some type. Inspectors should take action to ensure the safety of anyone approaching an electrical panel. This means preventing them from approaching the panel closely, or verbally warning them not to reach toward the panel for any reason, including pointing. They may forget and reach toward the panel anyway, and inspectors should be ready to physically prevent their contact. Laser pointers

are inexpensive and work well for safely identifying specific components being discussed without touching them.

For the same reason, after the dead front has been removed, an inspector should not leave the room if there is a chance that someone unfamiliar the dangers associated with touching exposed, energized electrical components may enter the room during the inspector's absence.

## Replacing the Dead Front



In replacing the dead front or panel cover, inspectors will confront the same hazards as in removing the cover.

In addition, if proper screws that are blunt have been replaced by pointed screws, the point of a screw may penetrate the insulation of a conductor, connecting the energized wire to a grounded component, such as the metal panel. This can cause an explosive short circuit. This risk is increased when an overly long screw is used.



Although some inspectors carry proper replacement screws, panels made by different manufacturers do not all use the same types of screws.

Some panel types have dead fronts that are inserted instead of bolted to the face of the enclosure. These typically slide into slots located at the top of the enclosure and have one or two screws at the bottom.

## Quiz 6

Before touching an electrical panel, an inspector should \_\_\_\_\_.

- test it with a voltage detector to ensure that it is not energized
- check the panel for code compliance
- remove his shoes to improve grounding
- replace any improper screws



T/F: Some voltage detectors may not work properly if the user is not reasonably well-grounded.

- True
- False

T/F: Reaching inside an electrical panel is safe as long as the inspector is reasonably well-grounded.

- False
- True

Pushing wires aside to expose a panel rating label may cause \_\_\_\_\_.

- an explosive short circuit
- a lowering of the amperage rating
- a main disconnect
- kinking of the conductor

An inspector should insert nothing that is \_\_\_\_\_ into an electrical panel.

- conductive
- ungrounded
- insulated
- grounded

The proper screws for securing a dead front are \_\_\_\_\_.

- fine-threaded and blunt
- coarse-threaded for quick installation
- Phillips head-type
- gold-colored

Size 00 electrical gloves are rated for \_\_\_\_\_ volts.

- 500
- 250
- 5,000
- 1,000

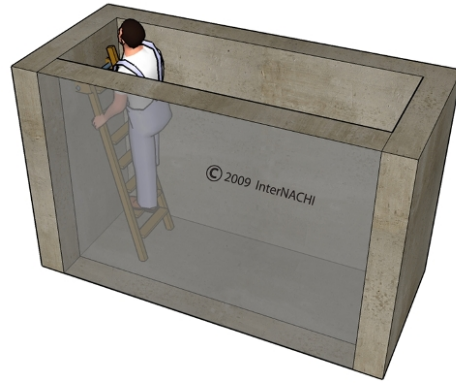
T/F: To protect his/her personal safety and to avoid potential damage to the system, the inspector should wear appropriate safety gear/apparel while performing the electrical inspection.

- True
- False

# Confined Spaces

## What Is a Confined Space?

"Confined space" is a term that all home inspectors should be familiar with. It pertains to many areas that inspectors evaluate, such as crawlspaces and attics.



Confined spaces can be found in nearly all places of employment, including construction sites. OSHA requires employers to evaluate their workplaces to determine if any spaces are permit-required confined spaces. It sounds simple enough, but what are confined and permit-required confined spaces, and what are some of an employer's responsibilities regarding them?

Regardless of whether OSHA has jurisdiction in the matter, inspectors should know what a confined space is. The most detailed description can be found in OSHA's General Industry Standards.

A confined space, as defined by OSHA's General Industry Standard 29.CFR.1910, is a space that:

1. is large enough and is so configured that an employee can bodily enter and perform assigned work;
2. has limited or restricted means for entry or exit (for example: tanks, vessels, silos, bins, hoppers, vaults, pits, etc.); and
3. is not designed for continuous employee occupancy.

While confined spaces by themselves are not inherently unsafe, they can be, under certain conditions.



## Permit-Required Confined Spaces

A "permit-required confined space" is a potentially more dangerous area and is defined as a confined space having one or more of the following characteristics:

1. It contains or has a potential to contain a hazardous atmosphere.
2. It contains a material that has the potential for engulfing an entrant.

3. It has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or by a floor which slopes downward and tapers to a smaller cross-section.
4. It contains any other recognized serious safety or health hazard.

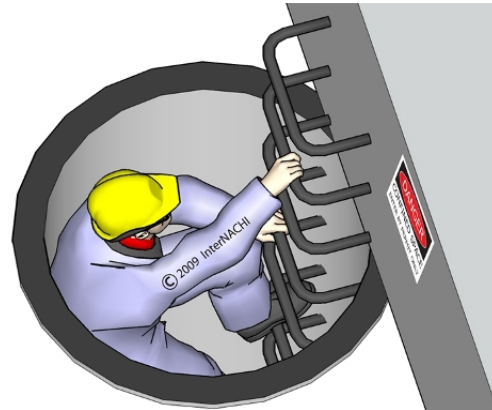
Are permits required for inspecting crawlspaces? For residential properties, the answer is generally no. The permit requirement pertains to commercial properties only.

Regardless of the type of property, in all circumstances, an inspector should never enter a confined space unless someone is aware of his/her location.

If an employer decides that his/her employees will enter permit-required confined spaces for any reason, the employer must develop and implement a permit-space program, as required in OSHA's Confined-Space Standard. This applies to multi-inspector firms and includes all sub-contractors.

All employees entering confined or enclosed spaces must be trained as to the nature of the hazards involved, the necessary precautions to be taken, the use of appropriate protective and emergency equipment, and specific permit-space entry procedures.

Why is it important for residential inspectors to be aware of these rules? These considerations encourage home inspectors to think about the spaces they are about to enter because taking similar precautions can be potentially life-saving.



## Quiz 7

T/F: An inspector should notify someone of his/her intentions to enter a confined space because \_\_\_\_\_.

- s/he could become trapped or injured and require assistance
- the client may incur additional liability if the inspector is injured inside it
- it is required by OSHA regulations

Each of the following is a characteristic of a confined space, except that \_\_\_\_\_.

- it's a space in which a worker cannot stand fully upright
- it's not designed or configured for continuous occupancy
- it has a limited or restricted means of entry and/or exit
- it's large enough for a person to enter to perform repair or maintenance tasks

Inspectors are likely to find poor electrical work in \_\_\_\_\_.

- confined spaces
- non-urban areas
- single-story homes

T/F: According to OSHA, a confined space is designed for continuous employee occupancy.

- False
- True

T/F: A permit is required to enter a confined space at a residential property.

- False
- True

## Attic Inspection

Attics are important areas to inspect because they often contain components of the electrical, plumbing, structural and roofing systems that are not obvious to the homeowner. Defective, sometimes dangerous or damaging conditions can go unnoticed for a long time. As a significant percentage of the home space, attics can have an effect on comfort levels, energy costs, structural longevity, and human health.

## Inspection Hazards

Are attics considered confined spaces? Based on the OSHA criteria, the answer is yes. If you think about a majority of residential attics, inspectors run into many of the same hazards.

Here's a partial list:

- stored items that impede easy movement and which may hide other hazards;
- no flooring;
- insulation, including fiberglass, blown insulation, vermiculite, newspaper, etc.;
- dust;
- insects, including bees and wasps;
- protruding nails;
- ductwork;
- plumbing and piping;
- electrical boxes and wiring;
- inadequate lighting;
- low headroom; and
- small access doors.

So, how safe are these confined spaces? Some of the potential hazards found in attics include:

- losing your grip or your footing and falling, possibly through the ceiling below;
- tripping on a joist;
- hitting your head;
- cutting yourself on ductwork;
- injuring yourself on an exposed nail;
- coming into contact with exposed electrical wiring;
- accidentally ingesting or breathing in insulation; and
- disturbing a concealed insect or vermin nest.

Also, inspectors should be conscious of the possibility of heat stroke and heat exhaustion, especially when inspecting an attic on a hot day. Many attic spaces have poor ventilation. Remember to hydrate, and limit your time spent in the attic, when necessary.

Practice safety for the obvious and the unseen hazards in attics, including using the appropriate PPE. Assess the situation, and be mindful of safe access and your surroundings. Some real-life hazards are described further.

## Attic Access

The attic inspection starts with gaining access. Typically, this is through a hatch in the ceiling of the top floor or through an exterior hatch at a gabled end.

Ceiling hatches are best accessed using a step ladder if the inspector has one that is tall enough. Step ladders that are too short make it more difficult to step from the attic onto the ladder.

Without someone to hold the ladder, this is the point at which the inspector is most vulnerable to falling. The best type of ladder is an articulating ladder that can be used as a height-adjustable step ladder.

A telescoping ladder can be used, but it means pushing the hatch lid up with the top of the ladder, which can mark or dent the hatch cover. It can also be tricky getting the lid back in place when removing the ladder. Leaning a ladder against a hallway wall means that the upper portion of the ladder closest to the hatch will not be positioned below the hatch but off to one side.



*Hatches in gabled ends are best accessed using an extension ladder.*

## Hatch Size

Modern standards call for attic access hatches to measure a minimum of 22½ inches by 30 inches, but many older homes have hatches smaller than this. Deciding whether he can safely enter an attic through a hatch is up to the individual inspector.

## Hatch Location

Hatches are sometimes located in places that make them difficult to access, such as above closet shelves. Trying to enter one can put an inspector in an awkward physical position that can increase the likelihood of falling, or breaking shelf components or the occupant's belongings.



*This hatch is relatively easy to access with a short extension ladder.*

## Attic Hazards

In order to perform the inspection thoroughly, an inspector will need to move through the entire center area of the attic to inspect the home's various systems and components, and this may require the inspector to get as close as safely possible to the eave. In doing so, inspectors may encounter a number of different types of hazards.

## No or Inadequate Lighting

Although some attics have a light with a switch near the hatch, many don't. The lack of a working attic light means that an inspector will be dependent on a flashlight, typically carried in one hand, leaving only one hand free for support and dealing with obstacles. Because attics often have restricted headroom requiring inspectors to move in a crouched position, having the use of only one hand may be a problem. This can be compounded



when the inspector must navigate through a maze of braces often found in roofs framed using roof trusses, or when the inspector must crawl back toward the eaves where headroom is even more limited. Carrying a spare flashlight is a good safety practice if an inspector's flashlight fails while he is at the back of the attic; otherwise, he risks trying to navigate back to the access hatch in the dark.

## Lack of a Walkway

Some homes have a walkway or floor installed in the attic, but many don't. This means that inspectors may have to walk on the ceiling joists or truss bottom chords, which are

often hidden beneath insulation. A misstep can mean damaging the ceiling below, or worse. This is one major reason that InterNACHI's Standards of Practice for Performing a General Home Inspection does not require inspectors to enter attic spaces if they believe that doing so may be unsafe or may cause damage. Many inspectors may choose to exceed the SOP and will enter and inspect attic areas. Because wiring, pipes, and other trip hazards may be hidden beneath the insulation, an inspector should move slowly. Further complicating access or a full, unobstructed inspection is that most homeowners store items in the attic, which can also impede an inspector's safe movement. As always, inspectors should use their best judgment and proceed with caution.



## Protruding Nails



Most homes have nails protruding through the roof sheathing that hold the roof-covering material in place. Depending on the nail length used, they may sometimes protrude an inch or more. Because nails may be dirty, in addition to a painful puncture wound, it's possible for an inspector to contract tetanus from a wound caused by a nail. Tetanus

is a serious and potentially fatal bacterial infection; however, immunization is common and effective. Both initial and booster immunizations are good for about 10 years. In addition to nails protruding through the roof sheathing, nails may protrude from any of the framing members, including lateral bracing and bracing being walked on and hidden beneath insulation.

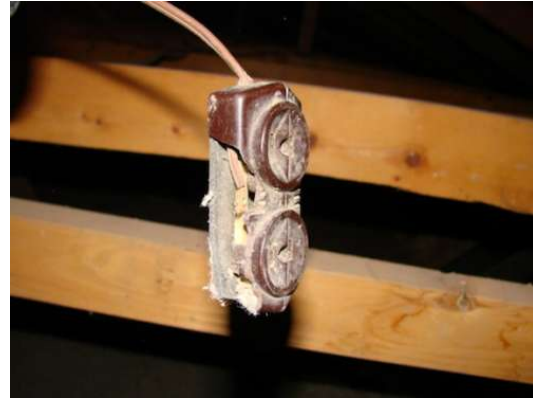
## Airborne Particulates

An inspector moving through thermal insulation disturbs particles small enough to become airborne. Once airborne, they can be inhaled. The danger is not just exposure to toxic material, such as asbestos, but also any pathogenic microbes, such as bacteria or mold spores, that may be attached to the particles. The dried feces of raccoons, rodents and birds, for example, can degrade into particles small enough to become airborne. Many of these particles carry a variety of diseases, some of which can be



serious or even fatal. That's why inspectors should use a respirator while inspecting attics to protect their lungs and mucous membranes.

## Electrical Hazards



*Above: improperly terminated wiring*

Substandard electrical work is not uncommon in attics, and inspectors face the possibility of coming into direct contact with energized electrical wiring.

It helps that an inspector moving through an attic is typically not well-grounded himself, but this won't be the case if the inspector is holding onto metal pipes or ductwork for support. Most electrical hazards are obvious. However, inspectors need to be careful what they reach for. Before reaching for an attic light switch, illuminate it with a flashlight to confirm that the box has a cover plate shielding energized wiring from direct contact.

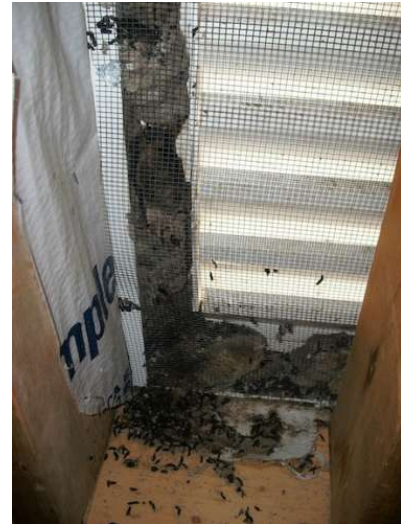
## Metal Ductwork

Metal ductwork has sharp edges that are sometimes left exposed. Without wearing gloves, an inspector risks getting a cut that may become infected.



## Stinging Insects

Bees and wasps find their way into attics to build nests. Some species are aggressive and will attack when their nest is approached or disturbed. Attacks may begin before an inspector realizes that there is a nest or even insects present in the attic. Because attics are not easy places to move through and leave quickly, the effort to escape can be more dangerous than the stinging insects themselves. Protective clothing that limits the area of exposed skin can help minimize the seriousness of an attack. If an inspector sees insects in an attic, he should be wary of the presence of a nest. An area of the attic that has a high concentration of flying insects can indicate the presence of a nest in that area.



*Bats roosting inside a gable vent  
(Photo courtesy of Mike Robeson)*

*Nesting wasps in the U.S. build a new nest each year and all but the queen die off during the winter in cold climates, so the danger of finding a nest an attic is significantly less at that time.*

## Bats

Attics are common places for bats to roost. Bats can carry rabies. Health department recommendations include:

- getting a pre-exposure immunization vaccination. These are less painful and expensive than post-exposure vaccinations and are similar to flu shots;
- wearing protective clothing, especially gloves. Exposing less bare skin is safer; and
- leaving the bats alone. Disturbing bats will increase the chances of being bitten.

## Raccoons

Raccoons are ferocious fighters and may attack if they're ill or feel cornered. They can also carry rabies. An inspector suddenly finding himself facing a raccoon in an attic should leave it and recommend

that it be inspected after any animals have been removed and any potential points of entry are sealed.



*Entry point into an attic for raccoons*

## Heat-Related Illness

During warmer times of the year, the temperature in some attics can exceed 140° F. Moving through a hot attic in a crouched, uncomfortable position while wearing long-sleeved protective clothing and breathing through a respirator that restricts full breathing can be stressful. Inspectors should be aware of the possibilities of heat-related illness.

The human body cools itself through the evaporation of sweat. If sweating is inadequate, an inspector may develop a heat-related illness. The early signs include the development of a heat rash, progressing to cramps, heat exhaustion and, finally, heat stroke. Exhaustion and stroke are the most serious. The symptoms of heat exhaustion are profuse sweating, muscle cramps, headache, weakness, nausea and vomiting. Those suffering from heat-related illness are subject to light-headedness or fainting. Inspectors experiencing these symptoms should leave the attic immediately.

To avoid heat-related illness, it's important that inspectors stay hydrated. Water or electrolyte-replacement solutions (sports drinks) are appropriate for staying hydrated.

If, in the inspector's opinion, an attic cannot be safely inspected, the inspector should mention in his report that the attic was not inspected for safety reasons, disclaim its condition, and recommend that it be inspected once safe conditions have been established.

## Attic Pull-Down Ladders

Attic pull-down ladders, also called attic pull-down stairways, are collapsible ladders that are permanently attached to the attic floor. Occupants can use these ladders to access their attics without being required to carry a portable ladder. However, some of these ladders can pose a hazard to an inspector attempting to gain access to an attic for inspection. Here are some things to be on the lookout for before entering.

### Common Safety Defects That Can Lead to Injury

Homeowners, not professional carpenters, usually install attic pull-down ladders. Evidence of this distinction can be observed in consistently shoddy and dangerous work that rarely meets safety standards.



Some of the more common defective conditions observed by inspectors include:

- cut bottom chord of structural truss. Often, homeowners will cut through a structural member in the field while installing a pull-down ladder, unknowingly weakening the structure. Structural members should not be modified in the field without an engineer's approval;
- fastened with improper nails or screws. Homeowners often use drywall or deck screws rather than the standard 16d penny nails or 1/4 x 3-inch lag screws. Nails and screws that are intended for other purposes may have reduced shear strength and they may not support pull-down ladders;
- fastened with an insufficient number of nails or screws. Manufacturers provide a certain number of nails with instructions that they all be used, and they probably do this for a good reason. Inspectors should be wary of "place nail here" notices that are nowhere near any nails;
- lack of insulation. Hatches in many houses (especially older ones) are not likely to be weather-stripped and/or insulated. An uninsulated attic hatch allows air from the attic to flow freely into the home, which may cause the heating or cooling system to run overtime. An attic hatch cover box can be installed to increase energy savings;
- loose mounting bolts. This condition is more often caused by age rather than installation, although improper installation will hasten the loosening process;
- attic pull-down ladders are cut too short. Stairs should reach the floor;
- attic pull-down ladders are cut too long. This causes pressure at the folding hinge, which can result in breakage;
- improper or missing fasteners;
- compromised fire barrier when installed in the garage;
- attic ladder frame is not properly secured to the ceiling opening;
- closed ladder is covered with debris, such as blown insulation or roofing material shed during roof work. Inspectors can place a sheet on the floor beneath the ladder to catch whatever debris may fall onto the floor; and
- cracked steps. This defect is a problem with wooden ladders.

In sliding pull-down ladders, there is a potential for the ladder to slide down quickly without notice. Always pull the ladder down slowly and cautiously.

Attic pull-down ladders are prone to a number of defects, most of which are due to improper installation. Inspectors should use an InterNACHI "Stop -- Inspector at Work" stop sign nearby. However, they should always use their professional judgment and err on the side of caution and decline performing that aspect of their inspection if mounting the ladder would be unsafe or cause any damage.

Inspectors can read more about it in InterNACHI's article on Attic Pull-Down Ladders.

## Quiz 8

Which of the following is typically not affected by the attic space?

- heating system functionality
- human health
- home energy costs
- comfort level in the living space

If, in the opinion of the inspector, an attic cannot be safely inspected, the inspector should \_\_\_\_\_.

- state in the report that the attic was not inspected for safety reasons, disclaim its condition, and recommend that it be inspected once safe conditions have been established
- do his best to inspect it anyway
- tell the client that the attic was unsafe for inspection
- state in the report that the attic was not inspected for safety reasons, disclaim its condition, and recommend that it be inspected by a different inspector

Which of the following is not a potential danger caused by inhaling particulates in attics?

- rabies
- bacteria
- mold spores

The best ladder to use for accessing an attic ceiling hatch is a(n) \_\_\_\_\_ ladder.

- articulating
- telescoping
- extension

## Crawlspaces, Cellars & Other Confined Spaces

**Is a crawlspace considered a confined space?**

**Typically, yes.**

Many crawlspaces meet OSHA's criteria for the classification of confined spaces. Also, many commercial high-rise buildings may have a "half-floor." These spaces are usually between full floors







and are only 4 or 5 feet from floor to ceiling. Typically, these spaces contain mechanical and electrical equipment. They may also be considered confined spaces and carry many potential hazards for the inspector. Do other types of spaces qualify as confined spaces, such as cellars? Many of them have ceilings as low as 6 feet.

Questions for inspectors to consider for their personal safety before entering such confined spaces include:

- How many entry/exit points does it have?
- Could I become trapped inside?
- Will my cell phone operate while I'm inside?
- Is someone else aware of my location?

Confined spaces take many forms and have various conditions that may prove hazardous. Many of the dangers found in crawlspaces, basements and cellars are similar to those found in attics, such as pests, and mechanical issues, such as inadequate lighting, protruding nails and metal objects, as well as electrical hazards. Additionally, crawlspaces, basements and cellars are usually damp, which means that mold and leaking sewage may be present, and coming into contact with these potential pathogens should be avoided or minimized by wearing the appropriate personal protective equipment and apparel.

An inspector must be aware of the area he is entering and must be able to evaluate each situation on its unique characteristics before deciding to proceed with the inspection. With the decision to proceed comes the decision on the appropriate PPE, which includes clothing and footwear, headgear, and possibly also respiratory equipment.

## Crawlspaces

A crawlspace is the area between the lowest floor of a building and the ground. It fits the definition of a confined space. According to OSHA, a confined space is an area whose enclosed conditions and limited access make it potentially dangerous.

Remember that a confined space is any space that:

1. is large enough for a person to enter to perform tasks;
2. has limited or restricted means of entry or exit; and
3. is not designed or configured for continuous occupancy.

According to InterNACHI's Standards of Practice for Performing a General Home Inspection:

"The inspector is not required to enter crawlspaces or other areas that may be unsafe or not readily accessible."

## Crawlspace Access

The crawlspace inspection starts with entering the crawlspace, which may be accessed from a hatch located either inside or outside the home.

An access hatch may be restricted for a number of reasons. It may be located in an area that is difficult to access, such as under a set of stairs. It may be covered over by furniture, a rug, or the occupant's belongings.



*Upper Right: A plumbing distribution pipe is blocking this crawlspace's access hatch.*

The opening may be small, or it may be partially blocked.

Restricted access is unsafe for a number of reasons because an inspector may need to exit the crawlspace quickly, such as after accidentally disturbing a nest of stinging insects, or when encountering wildlife, such as one InterNACHI home inspector did when he came upon a startled bobcat.



**There may be a number of different types of obstructions in the crawlspace, such as:**

- the height of the crawlspace;
- girders or walls supporting floor framing; or
- HVAC ducts.

The photo to the left shows a short wall built to support floor joists. Many inspectors would find crawling through this wall to examine the far side of the crawlspace uncomfortable but doable.

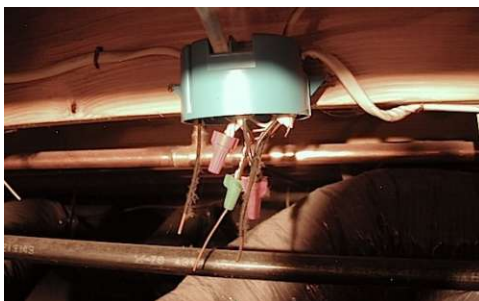
The double wall in the photo left makes entry and movement much more difficult, both because the alternating stud alignment of the two walls decreases the size of the opening, the footing extends higher above the floor of the crawlspace, and the footing is wider. Inspectors should not attempt to pass through barriers like this unless they have full confidence in their ability to do so with little risk.



## **Electrical Hazards in Crawlspaces**

The potential electrical dangers in a crawlspace are similar to those found in an attic. Any one of a variety of circumstances may cause dangerous conditions.

The sight of poor electrical work, like that depicted in the photo above, should alert inspectors to watch for electrical conditions that are less obvious, like that in the photo below.



*A potential shock, electrocution or fire hazard*

Workers in confined spaces are anxious to finish their work and get out. Those who are less diligent may leave before completing their project. Those who are both less diligent and don't know or don't care what they are doing may leave behind dangerous conditions. Workmen may be called away before they have a chance to finish. The causes are not as important as the understanding

on the part of inspectors that poor electrical work is more common in confined spaces than in parts of a home that are more accessible.

## Pathogens

Pathogens are micro-organisms that cause disease. Pipes carrying raw sewage are routed through crawlspaces. As these pipes age, it's not uncommon for their fittings to leak, which can introduce sewage into the area through which inspectors must crawl. Sewage contains high concentrations of biological agents, such as bacteria, fungi and parasites. The growth of these micro-organisms accelerates if the crawlspace is wet for long periods of time, as is implied by the efflorescence on the concrete foundation walls and stains on the framing shown in the photo above.



These micro-organisms may enter the human body when a person comes into contact with them and they touch the face. They can enter the body through inhalation, attached to airborne dust accidentally disturbed by the inspector. The best way to avoid becoming infected is to wear protective clothing, a respirator, and disposable gloves. After leaving the crawlspace, inspectors should remove their protective clothing and wash their face and hands.

When inspecting a crawlspace, the photo above represents what inspectors want to see, although it's more the exception than the rule, especially in older homes. Remember that the hazards associated with crawlspaces are not limited to access or space restrictions.



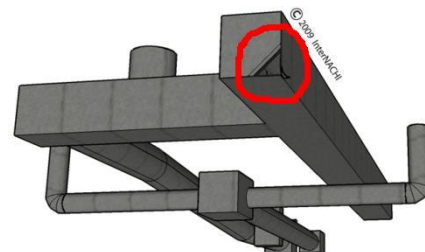
## Unseen Hazards

Let's stop for a moment and think about some common situations where an injury can occur. These examples are but a few of the dangers that lurk!

## Metal Ductwork and Hidden Areas

If an inspector reaches over the top of a section of metal ductwork, several things can happen, including:

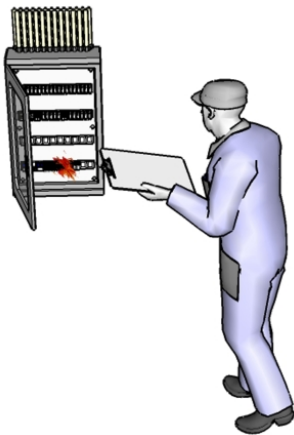
- an insect bite (especially from spiders);
- an electrical shock; an



- a cut.

## Electrical Panel Covers and Electrocution

Replacing or removing the cover or dead front of an electrical panel can easily result in a shock, electrical burn or even electrocution.



Imagine that you are crawling on your hands and knees in a crawlspace. It has a dirt floor and no vapor barrier. Lighting is limited, and you are crawling along carrying a flashlight in your hand. Unfortunately, you fail to notice the open electrical junction box ahead. It's tucked partially between exposed joists. Two conductors are neatly twisted together but have no insulated wire nut installed. Your skull comes into contact with these conductors. Your hands and knees are firmly planted on the ground. Electricity courses through your body.

Think it's unlikely? Think again. One should never enter a crawlspace with improperly supported electrical cabling or open junction boxes. Never enter a crawlspace where standing water can be observed, or in instances where there is an unusually high level of humidity or moisture. Look carefully for any electrical problems and open circuits.

## Asphyxiation

Death by asphyxiation is a genuine problem in some confined spaces. Well pits are notorious for being laden with methane gas. Technically, some confined-space entry requires atmospheric analysis to test for acceptable oxygen levels and the absence of deadly gases. Here's an excerpt of an OSHA report regarding a confined-space incident:

*An employee entered a fountain pit through a 3-foot by 3-foot opening. He descended 7 feet via a fixed ladder to the bottom of the pit to adjust the valves which controlled the fountain's water flow. The employee was unable to exit the space because he lost consciousness. A partner attempted to rescue him but was also unable to exit the pit because of the onset of weakness. He was, however, able to call security for assistance. A security guard and a passerby also attempted to enter the pit, but quickly abandoned the rescue due to the rapid onset of dizziness.*

*The fire department was called in to perform the rescue operation. Both employees were rescued, treated, observed and released. The oxygen level in that particular pit at the time the employees entered is unknown.*

The oxygen level was within the acceptable range when it was measured at the conclusion of the rescue. A similar pit at the same site, 60 feet away from the one described above, had an oxygen level of 13%. Three out of the four pits located in

the area had oxygen level readings of less than 19.5%. The evaluation of the last two pits yielded readings of 17.5% and 18.9%. Detector-tube readings indicated levels of carbon dioxide in excess of 11,500 parts per million (ppm). The permissible exposure limit (PEL) for carbon dioxide is 5,000 ppm. No flammable gases were found during the evaluation.

This incident is not an isolated one; it is similar to two cases investigated by the National Institute for Occupational Safety and Health's (NIOSH) Fatality Assessment and Control Evaluation (FACE) Program. Both cases (FACE 86-37 and FACE 91-17) involved employees entering control-valve pits and subsequently being overcome by an oxygen-deficient environment.

## **Formaldehyde and Airborne Particulates**

It's not news that formaldehyde and certain inhalable fibers (such as those found in insulation) are major irritants with prolonged or repeated exposure, and these substances pose well-known risks to home inspectors and those in the construction industry.

Despite the strength and durability of materials such as particleboard, most types contain formaldehyde and other volatile organic compounds (VOCs) whose emissions are not worth the risk to one's health. Minor symptoms from prolonged exposure include irritation of the eyes, nose, throat and respiratory tract, skin rashes, fatigue and headaches. In sensitive persons, formaldehyde can trigger an asthma attack. It's now been confirmed that it can also cause nasopharyngeal cancer, which affects the upper throat.

In addition to the formaldehyde found in wood composite products, it's also found in synthetic fibers, textile coatings and plastics.

Certain inhalable glass wool fibers include synthetic and man-made small, finely spun fibers of glass that form a mass resembling wool. Due to their low durability, most home insulation fibers are less likely to cause cancer in humans. However, mechanistic studies have shown that some glass wool fibers have the potential to cause damage to DNA.

## **A Clean Crawlpace**

Before you enter a crawlpace, one possible indication that there may be a snake present is the lack of any spider webs. A clean crawlpace, one that has very few spider webs, could be a caution sign. Snakes eat spiders, and diamondback rattlers are hungry during the cooler and cold months. Baby diamondbacks are found in certain areas of the U.S. during cooler months, and they have no rattles that can warn an intruder against coming too close. Watch out when entering clean crawlspaces, as these can be deceptively dangerous.

## Safety Tips for Inspectors

- Always wear the appropriate PPE. For chemical and other types of high-risk exposure, this means coveralls and gloves to prevent direct contact with harmful substances, and a respirator that can filter out harmful gases and particulates, as well as protect your mucous membranes.
- If a home or commercial property has components that contain hazardous substances, limit your exposure by limiting your time and contact. This may mean doing something as simple as going outside for a break and resuming your inspection after you've had an opportunity to clear your lungs and dust off your PPE. If your respiratory tract is sensitive or sore, drinking milk or having a snack of yogurt or other dairy product can coat your throat and protect it short-term from chemical irritants.
- Educate your clients on the hazards of common household and industrial carcinogens, whether those agents are confirmed or suspected. There is no need to alarm them, but knowledge is your clients' greatest protection. Refer them to the many relevant articles in InterNACHI's Articles Library.

Remember that danger lurks in many spaces. It is up to the inspector to check to see if the space is safe prior to entry. Technically speaking, atmospheric conditions must be verified to establish whether the breathing environment in the confined space will sustain human life.

## Quiz 9

A "confined space" is defined in OSHA's General Industry Standard (29 CFR 1910) as a space that \_\_\_\_\_.

- all answers presented
- is large enough and is so configured that an employee can bodily enter and perform assigned work
- has limited or restricted means for entry or exit (for example: tanks, vessels, silos, bins, hoppers, vaults, pits, etc.)
- is not designed for continuous employee occupancy

A confined space that has a potential to contain a hazardous atmosphere may be classified as a \_\_\_\_\_.

- permit-required confined space
- cellar
- vault
- pit

Based on the OSHA definition, attics are considered \_\_\_\_\_.

- confined spaces
- storage areas
- undefined spaces

Methane gas can cause death by \_\_\_\_\_.

- asphyxiation
- constipation
- dehydration

When moving through a damp crawlspace, an inspector coming into contact with a metal pipe is more at risk from electrical shock because he \_\_\_\_\_.

- may be grounded
- is likely not wearing rubber gloves
- may not be watching where he's going
- is producing static electricity

## Unusual Hazards in Problem Homes

### Hydroponics Inspection

Hydroponics is a method of growing vegetation without soil, oftentimes indoors or in a greenhouse. The environmental growing conditions are tightly controlled, which enables plants to survive in locales and during times of the year when they would otherwise not be able to. Hydroponic systems range from basic, homemade designs to expensive and automated manufactured kits.



While hydroponics can be used to grow specialty flowers and fruits and vegetables year-round or where an outdoor garden is not an option, its use is popular primarily for small- to large-scale marijuana grow operations, both legal and illegal. Regardless of their use, they pose special moisture and electrical hazards that inspectors should be aware of if they discover one on the premises.

### Hazards of Hydroponic Systems

- Hydroponic systems can pose a serious fire hazard, especially when grow lights are used improperly, electrical connections are frayed, ventilation is lacking, or flammable materials are in the vicinity.
- Damaged metal halide lights may cause serious skin damage.

- Hydroponic systems are prone to electrical hazards, especially when there is exposed wiring that could come into contact with water.
- High-intensity discharge (HID) lights pose a risk of explosion, especially when exposed to water.
- High levels of CO<sub>2</sub> from CO<sub>2</sub> generators can be toxic to vegetation and to people. Improperly burned fuel in carbon-dioxide generators can produce carbon monoxide.
- Tangled electrical cords, or extension cords strung on the floor, may pose a tripping hazard.

## **Inspection of Hydroponic Systems**

- A certified electrician should supervise all electrical wiring work.
- All electrical cords should be neatly organized and connections should be in good working order, with no exposed wiring.
- Grow lights should be shut off for at least six hours each day.
- Growing containers should be free of leaks.
- Growing areas should be cleaned frequently and always kept free of pests.
- Humidity levels should be closely monitored and controlled so as to avoid a buildup of potentially problematic moisture.
- Flammable items should be placed far from the hydroponic system, as such items pose a fire hazard when grow lights are powered on.
- HID lights should have ample clearance so that they are allowed to properly cool when turned off.
- HID bulbs should be kept free of fingerprints and moisture, and should not be turned on when they are cold.
- Metal halide lights should have protective coverings that minimize hazardous UVB rays from leaking out.
- Ballasts and HID lights should be placed in a position where they cannot be accidentally knocked over.
- The growing area should be well-ventilated with oscillating fans.
- Electrical circuits and receptacles should never be overloaded.
- Electrical cords should be properly matched to the receptacle; grounding wires should not be cut off of cords to use in non-grounding receptacles.

In summary, hydroponic systems are becoming increasingly popular in many regions for growing certain crops all year long. But they can pose serious hazards if they are not properly implemented and maintained. Inspectors can read more about it in InterNACHI's article on [Hydroponics Inspection](#).

## **Marijuana Grow Operations**

A marijuana grow operation -- or grow op -- is the cultivation of marijuana, sometimes illegally, for the purpose of sale and distribution. Indoor grow operations can be found in places such as houses, apartments, commercial businesses, empty warehouses, and



abandoned factories. There are thousands of illegal marijuana growers in the United States, but the problem is considerably more serious in Canada.

## Facts and Trends

- In Canada, marijuana grow operations are becoming so common that many police departments have given up trying to fight them. From 1994 to 2004, the number of marijuana cultivation offenses more than doubled, and Canadian law enforcement estimates that there are currently 50,000 grow operations in the country.
- In the Canadian province of British Columbia, marijuana growth generates an estimated \$7 billion annually.
- Most of the marijuana grown in Canada will eventually be sold in the United States, where it is worth more.
- Grow operations can be found in any type of house and community. Homes with grow operations are not necessarily cheap rentals or suspicious-looking, crumbling old homes in ramshackle communities. Newer homes in upscale communities are increasingly used to house grow operations.
- Although it may seem like a serious risk for a current grower to hire an inspector to examine their home, it does happen, if rarely. Many grow operations are not temporary, and the growers have an otherwise normal household. Drug dealers occasionally need their homes inspected, too.



## Why should inspectors care about grow ops?

As marijuana use, sale and distribution are becoming legalized around the U.S., both small-scale and large-scale licensed grow ops are flourishing, and many of these are safe, and well-supervised and maintained.

However, some illegal grow ops are set up in vacant or abandoned properties to protect the identity of the growers. A foreclosed home for sale, for example, may not have had anyone enter the premises for some time until the home inspector arrives for a scheduled inspection, only to discover that squatters or growers have taken over the residence.

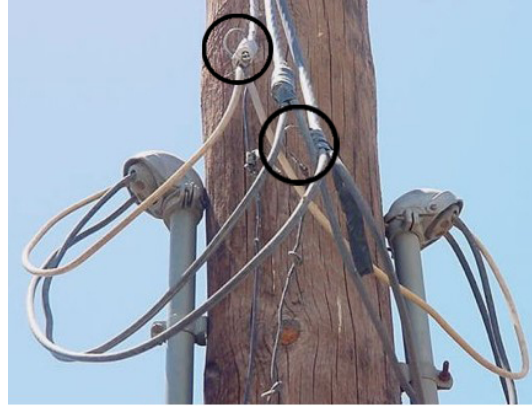
An inspector's physical safety may be at risk if he is perceived as an intruder by someone who is on the premises without the legal owner's permission and possibly conducting illegal activities.

Also, learning about the typical problems created by grow operations will enable inspectors to recognize defects. If an inspector can recognize that water damage, for instance, was a byproduct of a former grow operation, they may waste less time in the attic searching for the source of water leaks.

## Common indications of marijuana grow operations:

Heat and humidity. Water that is fed to plants will transpire and evaporate from the containers into the surrounding air. Cannabis plants also require warmth. Excess water vapor and high temperatures can lead to the following defective conditions:

- water damage. Water damage caused by grow operations will likely appear uniform throughout the room, unlike the generally localized damage caused by water leaks. Even normal house plants can create enough water vapor to damage shingles, and a large marijuana grow operation may cause a considerable amount of water damage.
- mold growth. Mold grows fast in humid environments. It can be a health concern, as well as a source of structural decay.
- lack of snow on roof in winter due to high temperatures indoors because of the use of grow lights, etc.
- unusually high amounts of steam coming from vents in winter.



Improper electrical connections. Grow operations, even relatively small ones, require an enormous amount of electricity for lighting. Some utility companies will report suspiciously high levels of consumption to police. In order to avoid this possibility, growers will often illegally bypass the electric meter to gain access to electricity without any record of the theft. They accomplish this by tapping electricity from the power lines before they reach the meter. In the accompanying photo, Romex® cable has been attached to large fish hooks that were used to tap utility lines at the pole and illegally deviate current into the home. Inspectors may encounter other types of inventive yet improper or dangerous electrical connections.

High electricity bills. Energy auditors, many of whom are inspectors, may come across a house that uses far more energy than seems necessary. Inspectors may also be given utility bill information from energy auditors.

## Other indications for InterNACHI inspectors and neighbors:

- skunky marijuana odor. Other odors may also be apparent, such as those from mothballs, air fresheners or chlorine, which are used in an attempt to mask the marijuana smell;

- unusual garbage at the property. Items used for growing marijuana, such as wiring, PVC piping and nutrient containers, may be discarded and left around the house;
- a humming sound. electrical equipment used for the growing operation can create sounds similar to transformers;
- windows covered in dark plastic or newspaper;
- perpetually illuminated rooms;
- extra security, such as guard dogs or unusually reinforced fencing (electrified, razor-wire, etc.).

In summary, inspectors may encounter unsafe or defective conditions caused by marijuana grow operations. If any of the noted telltale signs are present at a property to be inspected, the inspector should use his/her judgment in deciding whether to inquire as to the legality of the grow op, whether to involve law enforcement, or whether to decline the job altogether. An inspector who proceeds will want to use the appropriate respiratory PPE and clothing protection before entering the area.

## Meth Labs

Methamphetamine (also known by the terms "crystal meth," "meth" and "crack," among others) is a highly addictive and illegal stimulant. A meth lab is an illegal drug-manufacturing site, often a house or apartment, containing equipment and potentially toxic chemicals required to produce meth.



## Facts and Statistics About Meth Labs

- In 2003, more than 17,000 meth labs were seized by police in the United States. Seizures in recent years have been significantly fewer, but authorities estimate that tens of thousands of homes may be contaminated by toxic chemicals from meth labs.
- Far fewer meth labs per capita have been seized in Canada than in the United States.
- Meth labs can be found in any neighborhood, regardless of social, socio-economic, or ethnic composition.
- Carpeting, wallboard, ceiling tile and fabric may absorb spilled or vaporized chemicals. These chemicals may remain for many years after the meth lab has been disassembled, potentially poisoning future tenants. It can cost tens of thousands of dollars to make contaminated homes habitable.
- It is estimated that 5 to 7 pounds of chemical waste is produced for each pound of meth manufactured.
- One tablespoon of methanol, an ingredient required in meth production, can cause permanent blindness if ingested. Death can result from the ingestion of less than half of a cup of the chemical. Other common chemicals used to produce

- meth include bleach, household drain cleaner, benzene, methylene chloride, trichloroethane, battery acid, lye, ammonia, and muriatic acid. More chemicals can be formed during the “cooking” process.
- Chemicals required or created by the meth production process can cause health problems, such as cancer, brain and nervous system injury, injury to the liver and kidneys, birth defects, and reproductive disorders.
  - Meth labs can be very small. They have been found in bathtubs and inside vehicles.

## Why should inspectors care?

- for their own safety. If an inspector has been hired by an owner to inspect a home occupied by renters or squatters who are operating a meth lab on the premises, he could find himself in danger from the operators;
- for their own well-being. InterNACHI inspectors should not handle items that they believe are contaminated with dangerous chemicals; and
- for the safety of their clients. It is the inspector's responsibility to call out potentially dangerous conditions in a home, regardless of the cause or source.

## A Case Report

Jason and Rhonda Holt purchased a house in Tennessee to start their family. They were soon plagued by mysterious illnesses. Their three babies became pale and lethargic, requiring many trips to the emergency room where they were put on respirators, with one receiving steroids. Rhonda developed headaches, and her husband suffered kidney ailments. They endured these illnesses for years until they discovered, five years after moving into their house, that it was the location of a former meth lab. The Holts would need to spend more than \$30,000 to rid their home of the toxic chemicals that had saturated the home.

## Some Telltale Signs of a Meth Lab

The following conditions are indications that a residence is or was once used as a meth lab:

- the presence of equipment used to cook meth, such as pressure cookers, jugs, blenders, aluminum foil, pH test strips, turkey basting wands, rubber gloves, thermometers, funnels, strainers and duct tape;
- unusual odors. The odors associated with meth labs often smell sweet or bitter, and sometimes described as burning popcorn. An ammonia smell, similar to that of pet urine, may also be present. Waste products may have been dumped down



sinks, drains or toilets. These waste products can collect in drains, traps and septic tanks and can give off fumes;

- covered or blacked-out windows;
- chemical staining of walls and floors. Yellow or red stains are likely to be a result of phosphorous or iodine spillage;
- burnpits, stained soil, or dead vegetation indicating dumped chemicals from a meth lab;
- security measures, such as cameras or baby monitors outside of buildings. Unusual small holes in walls and doors may indicate runways for cables;
- trap doors in floors or walls for hiding evidence of illegal activity, such as packaged drugs, money or firearms;
- rust appearing on door hinges, cabinet knobs, light fixtures or keys. Corrosive gases, such as hydrochloric acid, cause this rusting;
- unusual burn marks;
- missing or detached smoke detectors; and
- unusual venting or plumbing.



## Testing

Some inspectors offer meth testing services for additional fees. Generally, inspectors charge for each sample test, and the more samples taken, the better. Nick Gromicko, founder of the International Association of Certified Indoor Air Consultants, says, "Once an inspector acquires one positive test, he should consider the home to be a former lab at that point, but numerous negative tests should be considered inconclusive."

## Should inspectors report meth labs to the authorities?

Inspectors are not DEA agents, and it is technically not the inspector's legal responsibility to report their suspicions to authorities. Furthermore, police generally do not care much about former meth labs, which are more of an environmental concern than a criminal issue.

Obviously, it is unlikely that an inspector will be invited to perform an inspection in a house that has a working meth lab, but it is possible if the home is occupied by renters or squatters who have taken up residence in a vacant home to conduct illegal activities. If an inspector encounters an operational meth lab, he should report it to police. If an inspector believes that a home, septic tank or yard may be contaminated, he should contact the local health department or Department of Natural Resources for advice.



# Post-Disaster Inspections

## Inspecting After an Emergency

InterNACHI has a comprehensive and informative article titled *Emergency Preparedness: How Home Inspectors Can Help Their Clients*. Knowing how to prepare for a disaster would be incomplete without also knowing what to do following a disaster, especially because there are dangers inherent in approaching a property following a major storm or other type of emergency.

Home inspectors can relay the following information to their clients. The steps for re-entry back onto the affected property will help the homeowner and the inspector stay safe.

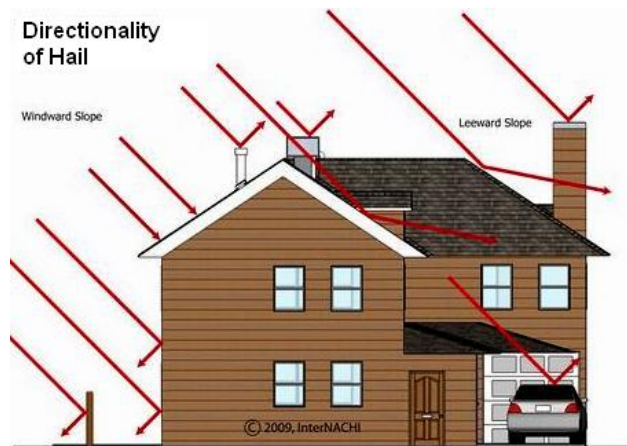
### We weathered the storm. Now what?

Being let back onto one's property after a disaster or emergency can be an emotional time, so it's important to allow emergency personnel and first responders to do their jobs and to follow their instructions. Generally, unless you can turn on all of your utilities again, your access may be limited, but it depends on your municipality and the scope of the damage. You may be instructed to boil your water for a brief period of time while governmental agencies confirm that it's potable and safe without treatment.

Before re-entering the home, do the following:

#### Check the exterior.

- Make sure that there are no downed power lines on or near your property. If there are, do not attempt to move them yourself; immediately contact utility company personnel or law enforcement.
- Check for broken tree branches that may impede access to the property, or which themselves may be in contact with power lines; again, enlist help in such situations to avoid a potentially fatal injury.
- Make sure the perimeter of the property is secure before allowing pets back onto it. Natural disasters can be disorienting for them, and they may try to escape.

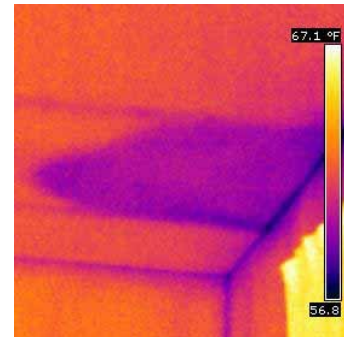




- Check any damage to windows and exterior doors, as well as the roof, chimney and other penetrations, but do so safely. Clients may defer this to their InterNACHI inspector.
- Check gutters, downspouts and exterior drainage for blockages, and clear them as soon as it's possible to do so safely.
- It's always best to document damage from the ground and contact an InterNACHI inspector who can make a more in-depth and detailed inspection. Even after you contact your insurance carrier, an unbiased inspection by a trained home inspector may reveal issues that are not immediately apparent, such as hail damage, which requires some expertise to properly identify, especially if the insurance investigator must inspect damage incurred by multiple clients in the aftermath of a widespread emergency.

## **Check the interior.**

- Before turning on the water and gas service to the home, check the individual appliances to make sure that they're undamaged. Document all damage, and contact utility personnel if you don't feel safe turning the fuel or water back on yourself. If there is no apparent damage or telltale smells or sounds (such as hissing) emanating from any appliances, it should be safe to turn on the gas and water at their shut-off valves. Make the same damage assessment before turning the electricity back on, too.
- Securely dispose of perishable food items left in the refrigerator during a power outage. Ensure that stray animals foraging for food can't access it. Some food left in the freezer may be salvageable, but always err on the side of caution to avoid serious illness caused by bacteria.
- Go back through the home to check for structural damage, including broken glass.
- In the aftermath of a storm or flood, check the basement, crawlspace and attic areas for moisture intrusion, as well as areas at window sills and exterior doors. Unchecked moisture can lead to mold problems and structural issues down the road. An InterNACHI inspector who is Infrared-Certified® can survey the home with an infrared camera, which can identify areas of moisture intrusion and energy loss that may not be visible to the naked eye.



## **Check in with neighbors and others.**

- Notify pet owners or Animal Control if you see disoriented domestic pets searching for their owners or homes. Also, avoid contact with wildlife that may have been forced from their natural habitat. Report their location to Animal Control.

Homeowners should schedule a meeting with an InterNACHI inspector who can help devise a checklist to prepare the house in the event of an emergency, as well as assess its condition afterward to make sure it's safe for the family to re-occupy. He or she can also help the client get started on an action plan for repairs.

## **FEMA's Post-Flood Guide**

### **General Tips**

**Don't return to your flood-damaged home before the area is declared to be safe by local officials.**

Returning home can be both physically and mentally challenging. Above all, use caution.

Check for injuries. Do not attempt to move seriously injured persons unless they are in immediate danger of death or further injury. If you must move an unconscious person, first stabilize the neck and back, then call for help immediately.

- Keep a battery-powered radio with you so you can listen for emergency updates and news reports.
- Use a battery-powered flashlight to inspect a damaged home.  
NOTE: The flashlight should be turned on outside before entering -- the battery may produce a spark that could ignite leaking gas, if present.
- Watch out for animals, especially poisonous snakes. Use a stick to poke through debris.

Be wary of wildlife and other animals.

- Use the phone only to report life-threatening emergencies.
- Stay off the streets. If you must go out, watch for fallen objects, downed electrical wires, and weakened walls, bridges, roads and sidewalks.

### **Before You Enter Your Home**

Walk carefully around the outside and check for loose power lines, gas leaks, and structural damage. If you have any doubts about safety, have your residence inspected by a qualified building inspector or structural engineer before entering.

## Do not enter if:

- You smell gas.
- Floodwaters remain around the building.
- Your home was damaged by fire and the authorities have not declared it safe.

## Going Inside Your Home

When you go inside your home, there are certain things you should and should not do. Enter the home carefully and check for damage. Be aware of loose boards and slippery floors. The following items are other things to check inside your home:

- **Natural gas.** If you smell gas or hear a hissing or blowing sound, open a window and leave immediately. Turn off the main gas valve from the outside, if you can. Call the gas company from a neighbor's residence. If you shut off the gas supply at the main valve, you will need a professional to turn it back on. Do not smoke or use oil, gas lanterns, candles or torches for lighting inside a damaged home until you are sure there is no leaking gas or other flammable materials present.
- **Sparks, broken or frayed wires.** Check the electrical system unless you are wet, standing in water, or unsure of your safety. If possible, turn off the electricity at the main fuse box or electrical panel. If the situation is unsafe, leave the building and call for help. Do not turn on the lights until you are sure they're safe to use. You may want to have an electrician inspect your wiring.
- **Roof, foundation, and chimney cracks.** If it looks like the building may collapse, leave immediately.
- **Appliances.** If appliances are wet, turn off the electricity at the main fuse box or electrical panel. Then, unplug appliances and let them dry out. Have appliances checked by a professional before using them again. Also, have the electrical system checked by an electrician before turning the power back on.
- **Water and sewage systems.** If pipes are damaged, turn off the main water valve. Check with local authorities before using any water; the water supply could be contaminated. Pump out wells and have the water tested by authorities before drinking. Do not flush toilets until you know that sewage lines are intact.
- **Food and other supplies.** Throw out all food and other supplies that you suspect may have become contaminated or come into contact with floodwater.
- **Your basement.** If your basement has flooded, pump it out gradually (about one third of the water per day) to avoid damage. The walls may collapse and the floor may buckle if the basement is pumped out while the surrounding ground is still waterlogged.

- **Open cabinets.** Be alert for objects that may fall out.
- **Clean up household chemical spills.** Disinfect items that may have been contaminated by raw sewage, bacteria or chemicals. Also, clean salvageable items.
- **Call your insurance agent.** Take pictures of any damage. Keep good records of repair and cleaning costs.

## Quiz 10

T/F: Following a natural disaster, if there are any downed power lines on or near the property, it is probably all right to step over them if emergency personnel is not present to prevent you from doing so.

- False
- True

Following a major storm, water at the interior of closed windows and doors \_\_\_\_\_.

- indicates possible moisture intrusion and/or structural issues, which should be investigated further by an InterNACHI inspector
- should be wiped up
- is probably not an issue if the doors are intact and windows are not cracked or broken

Unattended domestic pets roaming around in the aftermath of an emergency should be \_\_\_\_\_.

- reported to Animal Control
- herded into an enclosure
- shot in case they're rabid

Before turning the gas or electricity back on, homeowners should check for \_\_\_\_\_.

- an all-clear from utilities personnel
- whether the food in the refrigerator is still cold
- whether the phone is working

Hail damage is \_\_\_\_\_.

- sometimes mis-diagnosed or undetected
- easy to spot
- not a problem if you can't see it

# Animal and Pest Hazards

## Dealing with Dogs

With more 70 million dogs in the U.S., home inspectors will be asked to inspect homes that have a dog in residence. Dog aggression is a serious safety issue, and inspectors need to understand enough about evaluating the potential dangers to protect themselves.

When scheduling an inspection, one of the questions an inspector should ask the new client is: "Is there a dog at the property?" If the answer is yes, the inspector should ask that, prior to the inspection, the dog be removed or restricted to a part of the property that will allow the inspector to perform his work without having to come into contact with the dog.

If the answer is: "Yes, but it won't bite," an inspector should make the same request. It's not uncommon for a dog owner to claim that his dog doesn't bite, but most dogs will bite under certain circumstances.

Dog owners who claim that their dog won't bite usually mean that:

- they don't want to admit that they keep a dog that bites;
- they have never seen their dog bite anyone;
- they don't believe that their dog would ever bite anyone; or
- they don't understand the circumstances under which any dog may bite someone.

None of these meanings is an assurance that a dog will not bite.

Dogs that aren't aggressive in the presence of their owners may act differently if left alone at the property with a stranger, such as the inspector. This situation can be exacerbated if the inspector suddenly finds himself unexpectedly facing the dog inside the home. In addition to instincts of territoriality, a dog surprised inside a home is more likely to feel cornered than a dog accidentally confronted in a yard. A cornered dog is likely to feel threatened, and many dogs attack when feeling threatened. Dogs may show aggression for a variety of reasons, but to an inspector, it doesn't really matter why a dog becomes aggressive -- only whether it might become aggressive.

If an inspector is told that there will be no dog on the property but, upon arriving at the property, finds a dog present and unrestrained, he will have to make a decision about whether to proceed with the inspection.

The main concern is trying to determine whether the dog is likely to become aggressive. In evaluating the situation, inspectors should use some basic criteria.

What is Aggression?

First, inspectors should look for signs of aggression or threatening behavior.

Dogs that are healthy, have been well-treated, and are socialized to people will usually give a series of warnings before they reach a point at which they will bite. Dogs that are not healthy, have been mistreated, or have not been socialized to people may give little or no warning that they are about to attack.

Typically, though, dogs will exhibit some of the following increasingly serious warning signs:

- holding still and rigid;
- a guttural bark that sounds threatening;
- lunging or charging forward, but without making physical contact;
- holding onto a person, but without biting down hard;
- a “muzzle punch” (punching a person with its nose);
- growling;
- showing teeth;
- snarling (growling and showing teeth simultaneously); and
- snapping (no contact).

Bites can be of varying severity, including:

- a nip that leaves no mark;
- a bite that causes bruising;
- a bite that causes puncture wounds;
- a rapid succession of repeated bites; and
- a prolonged attack, with biting, holding with head-shaking.

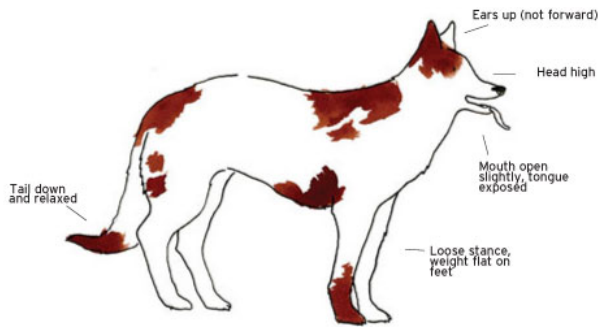
### Individual Evaluation

It is possible, with practice, to classify a dog’s behavior by its posture and facial expression. It should be remembered that behavior can change suddenly if conditions change, such as the arrival of another person, or the appearance of an inspector carrying something that the dog perceives as a threat, including a ladder or even a screwdriver.

If you need to approach a dog that is on a leash or restraint, or when observing a dog through a fence, look for the following:



## Happy and Relaxed



When a dog is happy and relaxed, it shows in its body language. Its muscles are relaxed, and its tail and ears are in a natural, neutral position. Dogs displaying aggression will often try to make themselves look bigger. Frightened dogs will try to make themselves look smaller. A relaxed dog displays normal posture.



This dog's eyes are soft, and her mouth is open and relaxed.



A dog that is happy and relaxed displays relaxed facial muscles. Its mouth is slightly open or closed. It may pant easily at a regular tempo. The corners of its mouth may be turned up slightly, making it look as though it's smiling. A dog that displays this posture is typically not a threat, although this posture may quickly change to fear or aggression as soon as an inspector steps into the yard.

## Playful

Playful behavior is easy to spot for anyone who has been around dogs. The dog will appear relaxed and happy and will often bow down in an invitation to play.



## Alert and Aroused

A dog that is alert is one that is aware that something is happening and focuses its attention. It will stand upright, with its weight distributed evenly on all four feet. With its ears up and forward, and its head, neck and tail held upright, the dog will appear



intense and focused. It may growl or bark, and the hair on its shoulders or back may be raised. If the dog is focused on the inspector, it means that it is evaluating him. The dog will wait to see what the inspector intends to do and try to determine to what degree the inspector is a threat. Especially if the dog is growling and the hair on its shoulders or back is raised, entering the yard is a very bad idea.

## Frightened and Submissive



Note the dog's hunched body, lowered head, flattened ears and tucked tail. The dog leans slightly and looks off to the side.



Here the dog licks her lips nervously.



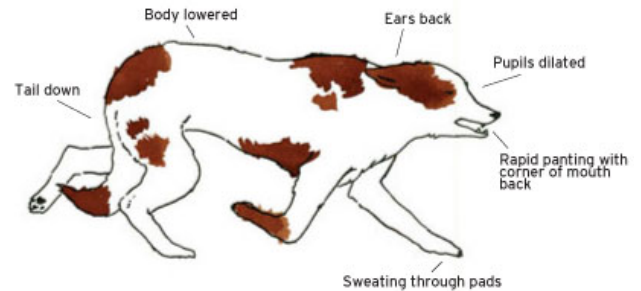
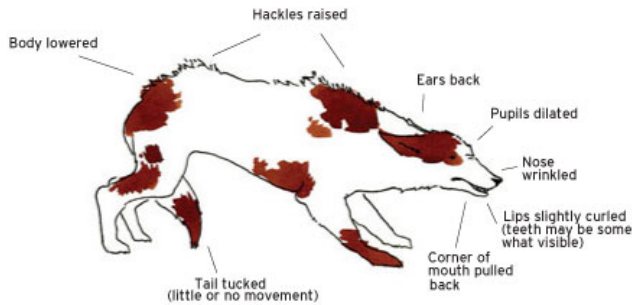
Now the dog yawns in an exaggerated way to release tension, much as a person would.

Frightened dogs try to make themselves look small. They often crouch, tucking their tail between their legs.

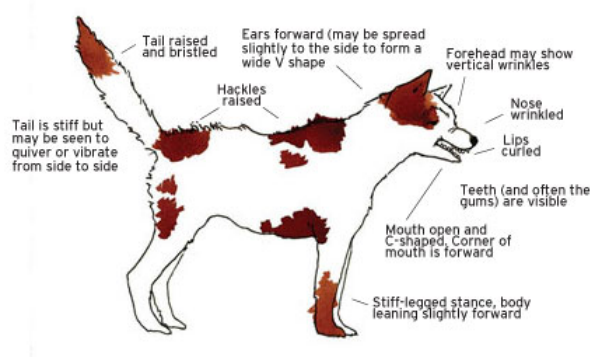
Dogs that are fearful will typically try to run away. Turning your back on a fearful dog is a bad idea because fear-aggression is often displayed by sneaking up behind a person whose back is turned and delivering a rapid series of nips or bites before running away again. If a fearful dog has no clear avenue of escape, it may react by attacking. Some fearful dogs decide that the best defense is a good offense and will bite without running away. Fearful dogs may hide or bite, so think twice before entering a yard with a dog displaying fear.

## Aggressive and Fearful

Dogs may be both aggressive and fearful. Inspectors should not mistake aggressive or fearful dogs for dogs that will run away. Stay out of yards with dogs displaying fearful aggression.



## Aggressive and Confident



An aggressive dog shows the same posture as an alert and aroused dog. However, in addition, it may be snarling and growling, with the hair on its back raised and its tail bristled. Stay out of the yard.



This is a preliminary aggressive threat. The dog's ears are back, she's giving a direct stare and her lips are pulled over her teeth.



The threat is more serious now. Her muzzle extends forward and she's giving a low growl.



Now she's wrinkled her muzzle to expose her front teeth. She's growling loudly and preparing to lunge forward and attack.

## Dog Aggression by Breed

The likelihood that a dog will become aggressive varies both with breed and with individual dogs. A study of more than 2,200 dog attacks that caused bodily harm was compiled over 17 years (and excluded trained police/guard dogs) and shows that most breeds inflicted fewer than five attacks.

The breakdown for more aggressive breeds is as follows:

Breed	Bodily Harm	Deaths	Maimings	% of Dog Population	Danger Index
pit bull	1,552	166	859	0.041	38
Rottweiler	457	73	246	0.009	51
husky	56	21	14	0.081	0.7
wolf hybrid	82	19	46	0.003	27
bull mastiff	58	9	31	0.013	4.4
German Shepherd	79	9	50	0.018	4.4
German Shepherd mix	37	7	24		
chow	53	7	35	0.016	3.3
pit bull mix	102	7	51		
Doberman	14	6	7	0.008	1.8
Akita	50	1	41	0.009	5.6
boxer	45	4	18	0.016	2.8
Labrador	36	3	28	0.116	0.3

*Higher Danger Index numbers indicate a greater degree of bite danger.*



Pit bulls are responsible for approximately 60% of all deaths resulting from dog attacks, Rottweilers are responsible 14%. No other breed is responsible for more than 5%. Inspectors should not enter a yard with any breed having a Danger Index number above.



Even dogs of breeds with Danger Index numbers below 1 (such as Labradors, pictured below) should be evaluated individually before entering a yard.

*Happy and relaxed dogs*



*Alert, not friendly, and potentially aggressive*





*Alert, not necessarily unfriendly, but not friendly, and potentially aggressive*



*Protective, distrustful, not showing aggression, but safer if not approached*



*Fearful, but not aggressive*



*Unhappy, but not aggressive*



*Neutral; may change if approached too closely*



## Common Myths and Mistakes

- A dog owner may suggest that once they have introduced you to the dog and you have talked to it, petted it, etc., leaving you alone with the dog is safe. Dogs are often insecure without their owners present, and the dog may become aggressive once the two of you are alone.
- Breeds that are powerfully built can cause serious injury without biting. People have been killed by dogs that were playing roughly. A muzzle is inadequate protection, not only for this reason, but because dogs are sometimes able to remove them.
- Making friends with the dog guarantees nothing. An inspector should assume that a dog will not learn to trust him in the few hours it takes to perform an inspection. Some actions that people view as friendly overtures are viewed as challenges by dogs. Reaching for a dog to pet it, staring directly into a dog's eyes, standing or stepping over a dog, putting your face near the dog's, or even approaching a dog may be viewed as a challenge. If you feel comfortable enough to enter a yard with a dog, the best course of action is to make the dog think you are ignoring it while watching for any signs of aggression. Once a dog decides that you are not a threat, curiosity will often cause it to relax and follow you around the yard.
- Pepper spray often works but may not stop a big, aggressive, determined dog. Inspectors should not put themselves in a position in which they have to rely on pepper spray. If an inspector enters a yard without realizing that it contains an aggressive dog, upon discovering that the dog is there, the inspector should avoid eye contact and back out of the yard very slowly.

## Quiz 11

T/F: If there is a dog at a property to be inspected, the inspector should ask whether the dog is likely to bite.

- False
- True

By looking a dog directly in the eyes, a person is communicating \_\_\_\_\_.

- a challenge
- honesty
- friendliness
- fear

When an inspector unexpectedly finds a dog in the yard of a home he is to inspect, the inspector should \_\_\_\_\_.

- proceed with the inspection if, after evaluating the risk, the inspector feels that it is safe to do so
- call the listing agent and ask that the dog be removed
- refuse to perform the inspection
- ignore the dog and proceed with the inspection

T/F: When unexpectedly discovering a dog in the yard, it is important for the inspector to immediately establish dominance.

- False
- True

Two of the most dangerous dog breeds are \_\_\_\_\_.

- pit bulls and Rottweilers
- pit bulls and mastiffs
- Rottweilers and Bulldogs
- Doberman Pinschers and German Shepherds

An alert, potentially aggressive dog will look \_\_\_\_\_.

- focused and intense
- nervous and tense
- angry and snarling
- away scared

T/F: Fearful dogs are afraid to bite.

- False
- True

## Arthropods and Snakes

Inspecting crawlspaces presents other potential dangers not directly related to the space's physical construction. They involve insects, reptiles and vermin. Any access to or from the exterior of the crawlspace also provides access for a variety of potentially harmful creatures.

## Venomous Spiders

Out of the 3,700 species of spiders found in the U.S., only about a dozen are considered a health threat. Some of the more common ones include the brown recluse, brown and black widow, and hobo spiders.



*From left to right: brown recluse, black widow and hobo spiders*

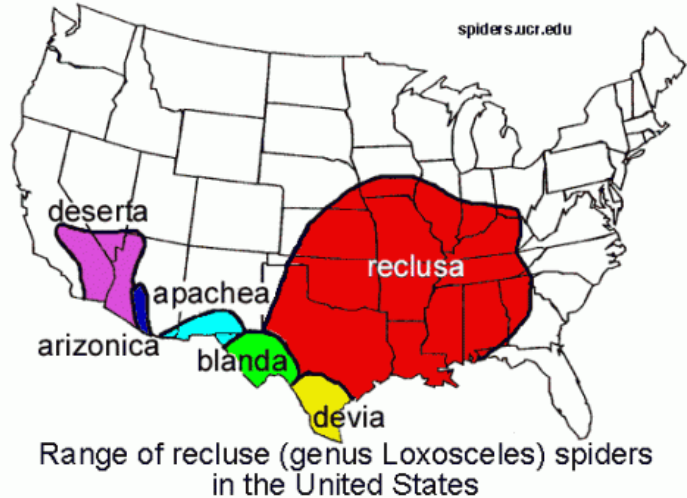
Spiders are particularly hazardous for many inspectors. Hobo and brown recluse spiders don't usually look for trouble, but people unlucky enough to be bitten by either are in for pain and sickness. Hobo spider bites become particularly painful, while the bite from a brown recluse often carries life-threatening complications from the resulting necrosis at the site of the bite. Unfortunately for the victim, this necrosis usually cannot be halted and often results in the amputation of affected areas.



*The aftermath of a bite from a brown recluse bite on fourth day (left) and sixth day (right)*

Adult brown recluse spiders are light brown in color with no markings on the body or legs. Their body length may vary from a  $\frac{1}{4}$ -inch to  $\frac{3}{4}$ -inch. Although they have a fearsome reputation, it is largely undeserved. Even heavy infestations may not be apparent because these spiders are reclusive (shy) and nocturnal. Only about 10% of their bites result in significant tissue damage that can lead to serious medical conditions, but a bite that does not heal or worsens needs swift medical attention and treatment, as a bite may lead to a serious blood infection.

Another insect worth noting is the brown widow spider, cousin to the notorious black widow. It is found in parts of the southern U.S., including Florida, Alabama, Louisiana, Mississippi and Georgia, and the coastal region of Southern California. It is generally lighter in color than the black widow species. Its color ranges from tan to dark brown to black, with shades of gray also possible. Like the black widow species in the U.S., it has a prominent hourglass-shaped marking on the underside of the abdomen; however, the brown widow's hourglass marking is usually an orange or yellowish color. Brown widows can be detected by finding their egg sacks in crawlspaces and cellars. Its bite is venomous to humans and is twice as potent as the black widow's venom, but it's usually confined to the bite area and surrounding tissue, as opposed to the black widow's venom, which can spread further. People who have been bitten typically describe the experience as very painful.



Other species of arachnids are just as threatening, such as the mouse spider (pictured below). An inspector should carefully evaluate the areas he is considering entering. Look for webs and other signs of insect habitation or intrusion. Contact your state's Department of Environmental Conservation and ask about the species of insects that one may encounter in your particular geographical area of operation. Inquire as to entomology, including dangers, attractions and preventative measures.



*Left to right: male mouse spider and female mouse spider*

## Scorpions

A scorpion is an eight-legged, venomous arthropod (invertebrate) that has a stinger at the end of its tail. Out of the 70 species in the U.S., all but four are located west of the Mississippi, but only one, the bark scorpion, is considered dangerous to humans, although others may cause painful stings.



*It may seem small and harmless, but handling a bark scorpion is bad idea.*

Of the 17,000 scorpion stings that were reported in 2009, more than half of them occurred in Arizona. Most scorpions prefer warm, dry climates, but some like cool, dank habitats, such as crawlspaces. They may also be found in other parts of a home. Because they can climb, they may be discovered in sinks, bathtubs, on walls and in closets.

## Centipedes

Centipedes don't sting but they are venomous and have powerful jaws whose bites can be painful. The biting giant red-headed centipede is found across the southern U.S. and is most common in desert environments. It can grow up to 9 inches long. Because centipedes sometimes feed on carrion, their bites tend to get badly infected.

During hot weather, they inhabit areas of the home that are dark, cool, and don't get much foot traffic, such as basements and crawlspaces.



## Snakes

Snakes are another problem. Copperheads, rattlesnakes and other poisonous species often reside in crawlspaces with dirt floors in regions where snakes are common.



Since portions of a typical home inspection can also include examination of the building site, including the landscaping, drainage and vegetation, it is extremely important to be careful in those areas and to wear appropriate protective clothing and footwear.

Snakes and other small reptiles are easily startled and may react aggressively toward intruders. The species and the physical bite location from such creatures will help determine the severity of an injury incurred. Again, the best thing to do is to check with your state's DEC for information.

The garter snake is harmless and can be found from Canada to Central America. There are many common species, and the members of most species are about 2 feet long. Most garter snakes are striped or banded lengthwise, and some are spotted between the stripes. Less aquatic as a group than the related water snakes, they are found near water in dry country and are widely distributed in humid regions. They prey on cold-blooded animals, such as frogs, toads, small fish and earthworms. Females bear live young in large litters, sometimes numbering 50 or more. The common garter snake of the northeast United States varies in color and pattern, but is usually blackish or brownish with three yellow stripes. The ribbon snake is a very slender type of garter snake that prefers wet places.



The black snake is a category for several snakes (not all closely related) that are black in color. In the United States, the name is applied chiefly to the black racer and the black rat snake. The black rat snake, also called the pilot black snake and the mountain black snake, is found in the northeastern United States. Like other rat snakes, it is a constrictor and feeds on rats and mice. It has shiny, slightly keeled scales, and grows up to 8 feet in length.



The boa, a general name for live-bearing constrictor snakes, is found mostly in the Americas. Boas capture their prey by striking with their teeth and simultaneously throwing their bodies in a coil around their victim. They then squeeze the animal until it suffocates. More than 30 boa species are found from Mexico to South America, although two species are also found in the United States. Boas may be terrestrial, arboreal or burrowing. Best known is



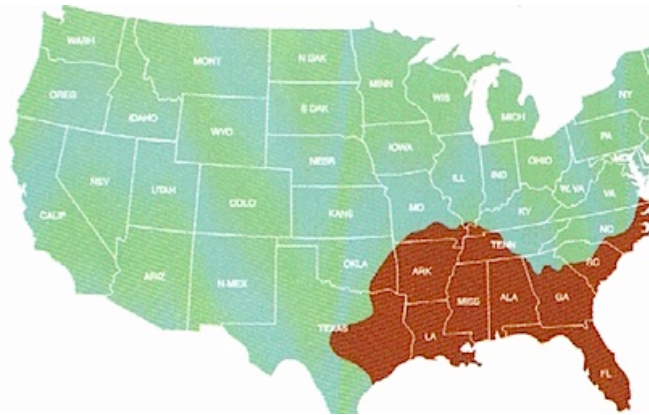
the boa constrictor, which lives in a variety of terrestrial habitats from southern Mexico to central Argentina. It averages 6 to 9 feet in length, occasionally reaching 14 feet, and has dark brown diamond-shaped markings on a lighter background. The rubber boa is found in humid regions of the far western United States and southwest Canada. It is a burrower, about 18 inches long, with a narrow, blunt head, a broad, blunt tail, and silver-green skin. It feeds primarily on lizards and rodents. The rosy boa is found in the southwest United States and northern Mexico; it grows to about 3 feet long. It has large, dark brown spots on a lighter background.

The king snake is a non-venomous, egg-laying, constricting snake of North America that varies in color and markings. The common king snake or chain snake of the eastern United States is usually about 3 to 5 feet long, and black or brown with yellow and white rings or bands that form a chainlike pattern. The scarlet king snake has a pattern of black, red and yellow bands similar to that of the unrelated coral snake. Other less brightly marked varieties of the same species are called milk snakes.



## Venomous Snakes

Although most venomous snakes will try to escape when a person approaches, they may not have the chance to. Inspectors working in areas known to have populations of venomous snakes should proceed with caution when moving into and through a habitat that provides a quiet place for them to regulate their body temperature, such as brushy areas, woodpiles, under decks and porches, and in crawlspaces. Inspectors who find themselves in a crawlspace with a venomous snake should leave immediately. Inspectors finding venomous snakes should leave them alone and notify the occupant, client and any agents involved. Recommend removal by a professional wildlife-control contractor.



*U.S. range of the cottonmouth; below: a copperhead*

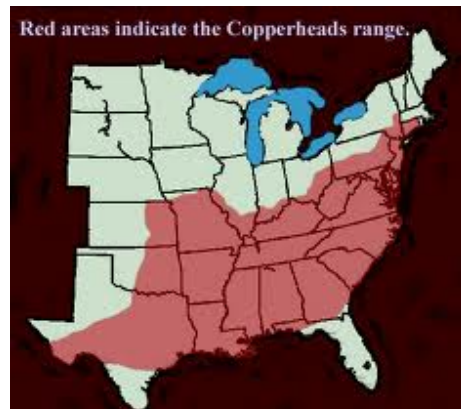
Rattlesnakes, cottonmouths and copperheads are pit vipers and can detect the heat of a candle from about 30 feet away. In a dark crawlspace, the snake may be aware of the inspector before the inspector realizes it's there. Especially in the southeastern U.S., which has the largest population of venomous snakes, and especially during hot weather, inspectors entering cool, damp crawlspaces should exercise extreme caution.

The copperhead is a poisonous snake found in the eastern U.S., as well as some areas of the central United States. Like its close relative the water moccasin (also known as the cottonmouth), the copperhead is a member of the pit viper family and detects its warm-



blooded prey by means of a heat-sensitive organ behind its nostrils. Its body, which may reach a length of 4 feet, is hazel-brown with chestnut-colored cross-bands on top, and pinkish white with dark spots on its underside. The head is a pale copper color and triangular in shape. Copperheads inhabit rocky areas with thick underbrush, even in heavily populated regions. Because of their adaptability across their range, they are even

found in urban areas. They are most active in late afternoon and early evening. The young are born alive. Copperheads are not aggressive and usually attempt to escape when threatened, but they strike swiftly if startled or attacked. Their bite causes severe pain and illness in humans, but is seldom fatal.



*Left: a coral snake; Right: U.S. range of the copperhead*

The coral snake is a poisonous species. About 30 different coral species inhabit Mexico, and Central and South America. Two species of this deadly snake are found in the U.S. The eastern coral snake is found in the southeast United States, specifically in Texas, Arizona and Florida, and also in northern Mexico.

The coral snake is a burrowing snake with a small, blunt head and a cylindrical body, averaging 2½ feet in length. Its body is ringed with bands of black, red and yellow; the tail has yellow and black rings only. The western coral (Sonoran) snake is a rather rare



species found in the southwest United States and northwest Mexico. It is about 18 inches long and has much broader bands of yellow than those of the eastern species. Coral snakes can be distinguished from a number of similarly colored harmless snakes by the fact that they are the only ones with red bands

touching yellow ones. The venom of coral snakes, like that of cobras, acts on the nervous system and causes paralysis, with a high mortality rate for humans who are bitten.

The rattlesnake is a poisonous snake of the pit viper family distinguished by a rattle at the end of its tail.

The head is triangular and wide at the base. The rattle is composed a series of dried, hollow segments of skin which, when shaken, make a whirring sound. When the snake is alarmed, it shakes its tail, and the noise serves as a warning to any approaching animal or person. Like other pit



vipers, they have heat-sensitive organs in pits on the sides of their heads, which help them locate and strike at their prey. The venom is highly toxic to humans and occasionally proves fatal. Rattlesnakes bear live young. The timber rattlesnake is found from southern Maine to northeast Florida, and from Iowa to Texas. Its average length is 3½ to 5 feet, with yellow or tan coloring and wide, dark cross-bands. The largest and deadliest species is the eastern diamondback rattlesnake of the southern United States, which grows up 8 feet long. The western diamondback is shorter and thicker than the eastern diamondback. The western or prairie rattlesnake sometimes lives in prairie dog burrows. The sidewinder is a North American desert species.

The water moccasin or cottonmouth is considered a highly venomous snake that is found primarily in the swamps and bayous of the southern United States. Like the closely related copperhead, it is a pit viper and has a heat-sensitive organ for detecting warm-blooded prey. The young are born live. The young snake is a pale reddish-brown with transverse dark brown bands edged with white; as it ages, the colors dull to a blotched olive or brown, and then to



an unmarked olive or blackish color in older specimens. It grows to a maximum length of 6 feet, with the average from 3 to 4 feet. If startled, it assumes a defensive posture by coiling and erecting its head, exposing the white interior of its mouth—hence, the nickname "cottonmouth." It eats both warm-blooded and cold-blooded animals.

Now that we've learned all we ever wanted to know about snakes, let's not forget vermin. Raccoons, rats, squirrels and any small mammals (including domesticated ones) that are cornered can quickly become aggressive, especially if there is a nest nearby. Crawlspace with entry points to the exterior are particularly susceptible to intrusion by vermin. Many species are known to carry rabies and other diseases, and many wild mammals have fleas.

## Quiz 12

The snake known to shake its tail when startled is the \_\_\_\_\_.

- rattlesnake
- king snake
- water moccasin
- garter snake

The water moccasin is also known as the \_\_\_\_\_.

- cottonmouth
- milk snake
- king snake
- western diamondback

The majority of scorpions in the U.S. are found in the \_\_\_\_\_.

- southwest desert
- Eastern Seaboard
- Pacific Northwest
- Northern Plains states

Upon exiting a crawlspace, an inspector should first \_\_\_\_\_.

- remove his PPE and wash his face and hands
- go outside and immediately perform the exterior portion of the inspection
- invite the homeowner down to see first-hand some of the inspector's findings

In addition to various insects and snakes found in many crawlspaces, inspectors should be wary of encountering \_\_\_\_\_.

- mammals, such as mice, rats and raccoons



- birds
- bats
- earthworms

Unlike other snakes that become startled, a water moccasin will not retreat but will first \_\_\_\_\_.

- coil and open its mouth wide and expose its fangs
- shake its rattles
- hiss loudly
- strike with deadly force

# What to Do in Case of an Injury

## General First Aid Information and Disclaimer



The information presented here is for educational use only. Nothing contained in this course is or should be considered or used as a substitute for medical advice, diagnosis or treatment.

This course does not constitute the practice of any medical, nursing or other professional healthcare advice, diagnosis or treatment.

We advise users to always seek the advice of a physician or other qualified healthcare provider with any questions regarding health or medical conditions.

Never disregard, avoid or delay seeking medical advice from your doctor or other qualified healthcare provider because of something you have read in this course.

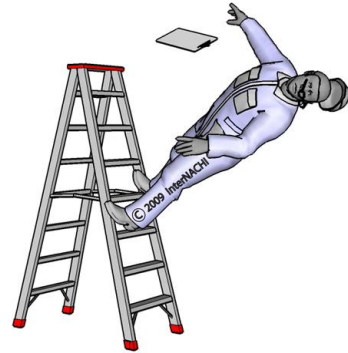
If you have or suspect that you have a medical problem or condition, please contact a qualified healthcare professional immediately.

If you are currently experiencing a medical emergency, please seek help immediately.

# What to Do If You Fall from a Ladder

If you fall from a ladder, do the following:

- Calmly assess the situation and determine if you are hurt.
- Get up slowly.
- If you have sustained an injury which prevents you from standing or walking, don't panic. Call for assistance. If the injury is serious, call 911.
- If you are not injured, rest for awhile and regain your composure before climbing again.



## Skull Fractures

### First Aid for Skull Fractures:

1. Check the airway, breathing and circulation (pulse), or "ABC." If necessary, begin rescue breathing and CPR. (If you are not qualified to administer CPR, be sure to get trained and certified through your local hospital.)
2. Avoid moving the victim (unless absolutely necessary) until medical help arrives. Instruct someone to call 911 (or another emergency number) for medical assistance.
3. If the victim must be moved, take care to stabilize the head and neck. Place your hands on both sides of the head and under the shoulders. Do not allow the head to bend forward or backward, or to twist or turn.
4. Carefully check the site of the injury, but do not probe in or around the site with a foreign object. It can be difficult to ascertain accurately if the skull is fractured or depressed (dented in) at the site of the injury.
5. If the head is bleeding, apply firm pressure with a clean cloth to control blood loss over a broad area.
6. If blood soaks through the original cloth, do not remove it. Rather, apply additional cloths on top, and continue to apply pressure.
7. If the victim is vomiting, stabilize the head and neck, and carefully turn the victim to the side to prevent the victim from choking on vomit.
8. If the victim is conscious and experiencing any of these symptoms, transport him/her to the nearest emergency medical facility, even if s/he does not think medical assistance is necessary.





## Closed-Head Injuries

A closed-head injury is an injury to the brain inside an intact skull.

Injury to the brain causes swelling, which quickly increases the pressure within the skull, known as intracranial pressure. The increased pressure causes more damage to the brain, which causes more swelling, and so on. A concussion is a type of closed-head injury.



Some types of closed-head injuries stop the swelling cycle automatically, such as with a concussion, while others will continue to get worse until the victim dies, such as with an epidural hematoma. The only way to tell the difference is through a CT scan, which looks at the brain and the skull.

A victim struck with a blunt object should be watched for signs and symptoms of a closed-head injury. Symptoms often will not show up immediately. If a victim of blunt-head trauma displays any of the following symptoms, call 911 immediately.

### Signs and symptoms of a closed-head injury include:

- loss of consciousness at the time of the injury (such as getting knocked out);
- short-term memory loss (where the victim keeps repeating questions);
- unable to wake the victim from sleeping;
- confusion;
- vomiting;
- dizziness;
- very high blood pressure; and/or
- very slow pulse.

## Head Injury First Aid

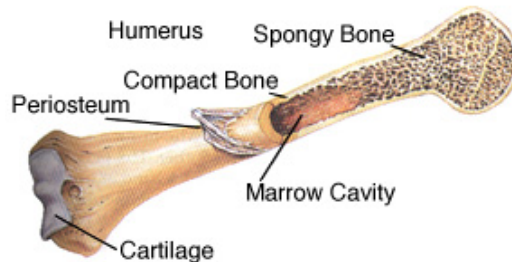
In all cases of injury to the head and neck, it's vital not to move the victim. Support his/her head in the position you found it. The vertebrae of the spine can be injured from movement of the head during trauma. Broken or displaced vertebrae can cut or put pressure on the nerves of the spinal cord, causing loss of sensation and/or temporary or permanent paralysis.

Vomiting can lead to problems with the victim's airway. If the victim begins vomiting and is unconscious, place the victim in the recovery position to let the vomit drain from the victim's mouth.

Here's a short video by the British Red Cross that shows what to do in case of an injury, and how to make sure the victim is properly placed in the recovery position. (Remember

that the emergency number in the U.S. is 911. If you're outside the U.S., be sure you know your emergency number.)

## Broken Bones



A fracture is a broken bone. It requires medical attention, period. If the broken bone is the result of a major trauma or injury, call 911 or your local emergency number.

### Also call for emergency help if:

- the person is unresponsive, isn't breathing, or isn't moving. Begin cardiopulmonary resuscitation (CPR) if there's no respiration or heartbeat;
- there is heavy bleeding;
- even gentle pressure or movement causes pain;
- the limb or joint appears deformed;
- the bone has pierced the skin;
- the extremity of the injured arm or leg, such as a toe or finger, is numb or bluish at the tip;
- you suspect a bone is broken in the neck, head or back; or
- you suspect a bone is broken in the hip, pelvis or upper leg. For example, the leg and foot turn outward abnormally, compared with an uninjured leg.



### Take these actions immediately while waiting for medical help:

- Stop any bleeding. Apply pressure to the wound with a sterile bandage, a clean cloth or a clean piece of clothing.
- Immobilize the injured area. Don't try to realign the bone, but if professional help isn't readily available and you've been trained in how to splint, apply a splint to the area.

- Apply ice packs to limit swelling and help relieve pain until emergency personnel arrive. Don't apply ice directly to the skin — wrap the ice in a towel, piece of cloth, or some other material.
- Treat for shock. If the victim seems confused, shivers or complains of being cold, seems unsteady or faint, or is breathing in short, rapid breaths, lay him down with the head slightly lower than the trunk and, if possible, elevate the legs, and cover him with a coat or blanket.

## Electrical Burns

An electrical burn may appear minor or not show on the skin at all, but the damage can extend deep into the tissue beneath the skin. If a strong electrical current passes through the body, internal damage, such as a heart rhythm disturbance or cardiac arrest, can occur. Sometimes, the jolt associated with an electrical burn can cause you to be thrown or to fall, resulting in fractures or other associated injuries.



Dial 911 or call for emergency medical assistance if the person who has been burned is in pain, is confused, or is experiencing changes in his or her breathing, heartbeat or consciousness.

While helping someone with an electrical burn and waiting for medical help, follow these steps:

- Look first. Don't touch. The person may still be in contact with the electrical source. Touching the person may pass the current through you.
- Turn off the source of electricity, if possible. If not, move the source away from both you and the injured person using a non-conducting object made of cardboard, plastic or wood.
- Check for signs of circulation (breathing, coughing and movement). If absent, begin CPR immediately.
- Prevent shock. Lay the person down with the head slightly lower than the trunk, with the legs elevated.
- Cover the affected areas. If the person is breathing, cover any burned areas with a sterile gauze bandage, if available, or a clean cloth. Don't use a blanket or towel. Loose fibers can stick to burns.





## Puncture Wounds

A puncture wound doesn't usually cause excessive bleeding. Often, the wound seems to close almost instantly. But that doesn't mean that medical treatment isn't necessary.

A puncture wound — from stepping on a nail or being stuck with a tack — can be dangerous because of the risk of infection. The object that caused the wound may carry spores of tetanus or other bacteria, especially if the object has been exposed to the soil. Puncture wounds resulting from human or animal bites, including those of domestic dogs and cats, may be especially prone to infection. Puncture wounds on the foot are also more vulnerable to infection.

If the bite is deep enough to draw blood and the bleeding persists, seek medical attention. Otherwise, follow these steps:

1. Stop the bleeding. Minor cuts and scrapes usually stop bleeding on their own. If they don't, apply gentle pressure with a clean cloth or bandage. If bleeding persists — if the blood spurts or continues to flow after several minutes of pressure — seek medical assistance.
2. Clean the wound. Rinse the wound well with clear water. Tweezers cleaned with alcohol may be used to remove small particles at the surface.
3. If larger debris remains deeply embedded in the wound, seek medical assistance. Thorough wound cleaning reduces the risk of tetanus. To clean the area around the wound, use soap and a clean washcloth.
4. Apply an antibiotic. After you clean the wound, apply a thin layer of an antibiotic cream or ointment (Neosporin®, Polysporin®, etc.) to help keep the surface moist. These products can discourage infection and allow the body to heal more efficiently. Certain ingredients in some ointments can cause a mild rash in some people. If a rash appears, stop using the ointment.
5. Cover the wound. Exposure to air speeds healing in treated wounds, but bandages can help keep fresh wounds clean and keep harmful bacteria out.
6. Change the dressing regularly. Do so at least daily or whenever it becomes wet or dirty. If you're allergic to the adhesive used in most bandages, switch to adhesive-free dressings or sterile gauze and hypoallergenic paper tape, which don't cause allergic reactions. These



supplies are available at pharmacies.

7. Watch for signs of infection. Seek medical assistance if the wound doesn't heal or if you notice any redness, drainage, warmth or swelling.

If the puncture is deep, is located in your foot, is contaminated, or is the result of an animal or human bite, seek immediate medical assistance so that the wound can be evaluated, cleaned and, if necessary, closed. If you haven't had a tetanus shot within the last five years, you should consider getting a booster within 48 hours of the injury.

If an animal inflicted the wound (especially a stray dog or a wild animal), you may have been exposed to rabies, so seek immediate medical assistance. You may receive antibiotics or the initiation of a rabies vaccination series. Report such incidents to county public health officials. If possible, the animal should be confined for 10 days for observation by a veterinarian.



## Severe Bleeding

If possible, before you try to stop severe bleeding, wash your hands to avoid infection and put on synthetic gloves. Don't reposition displaced organs. If the wound is abdominal and organs have been displaced, don't try to push them back into place. Cover the wound with a dressing and seek immediate medical assistance.

For other cases of severe bleeding, follow these steps:

1. Call 911.
2. Have the injured person lie down. If possible, position the person's head slightly lower than the trunk, or elevate the legs. This position reduces the risk of fainting by increasing blood flow to the brain. If possible, elevate the site of bleeding.
3. While wearing gloves, remove any obvious dirt or debris from the wound. Don't remove any large or more deeply embedded objects. Don't probe the wound or attempt to clean it at this point. Your principal concern is to stop the bleeding.
4. Apply pressure directly on the wound. Use a sterile bandage, clean cloth or even a piece of clothing. If nothing else is available, use your hand.
5. Maintain pressure until the bleeding stops. Hold continuous pressure for at least 20 minutes without looking to see if the bleeding stopped. You can maintain pressure by binding the wound tightly with a bandage (or even a piece of clean clothing) and adhesive tape.
6. Don't remove the gauze or bandage. If the bleeding continues and seeps through the gauze or other material you are holding on the wound, don't remove it. Instead, add more absorbent material on top of it.
7. Squeeze a main artery, if necessary. If the bleeding doesn't stop with direct pressure, apply pressure to the artery delivering blood to the area of the wound. Pressure points of the arm are on the inside of the arm just above the elbow and just below the armpit. Pressure points of the leg are just behind the knee and in

- the groin. Squeeze the main artery in these areas against the bone. Keep your fingers flat. With your other hand, continue to exert pressure on the wound itself.
8. Once the bleeding has stopped, immobilize the injured body part. Leave the bandages in place and get the injured person to medical help as soon as possible.

If you suspect internal bleeding, seek emergency help. Signs of internal bleeding may include:

- bleeding from body cavities;
- vomiting or coughing up blood;
- bruising on the neck, chest, abdomen or side (between the ribs and hip);
- wounds that have penetrated the skull, chest or abdomen;
- abdominal tenderness, possibly accompanied by rigidity or spasm of abdominal muscles;
- fractures; and/or
- shock, indicated by weakness, anxiety, thirst, and/or skin that's cool to the touch.

## **Animal Bites**

The home inspector goes where many do not. It is not unusual to find ourselves in dark, cramped spaces. Many times, these spaces have access from the exterior of the home. As such, and especially in colder months or in inclement weather, animals will venture into these spaces. Sometimes they build nests there. Especially in crawlspaces, unused attics, seldom-used garages, and storage sheds, the inspector may startle an animal. When an animal is frightened and cornered, anything can happen, including bites. Don't forget that the same can hold true for domesticated pets, such as the homeowner's cat or dog, that may be sleeping in a room the inspector enters.

Domestic pets cause the majority of animal bites. Dogs are more likely than cats to attack and bite. Cat bites, however, are more likely to cause infection. Bites from non-immunized domestic animals, as well as wild animals, carry the risk of rabies. Rabies is more common in raccoons, skunks, bats and foxes than in cats and dogs. Rabbits, squirrels and other rodents rarely carry rabies.

If an animal bites you, follow these guidelines:

- If the bite barely breaks the skin and there is no danger of rabies, treat it as a minor wound. Wash the wound thoroughly with soap and water. Apply an antibiotic cream to prevent infection, and cover the bite with a clean bandage.
- If the animal bite creates a deep puncture of the skin or the skin is badly torn and bleeding, apply pressure with a clean, dry cloth to stop the bleeding and seek medical attention immediately.
- If you notice signs of infection, such as swelling, redness, increased pain or oozing, seek medical attention immediately.
- If you suspect the bite was caused by an animal that might carry rabies — including from a wild or domestic animal of unknown immunization status —



seek medical attention immediately. Rabies can be fatal in humans. Doctors recommend getting a tetanus shot every 10 years. If your last one was more than five years ago and your wound is deep or dirty, your doctor may recommend a booster. You should have the booster within 48 hours of the injury.

## **Snake Bites**

### **The Danger of Snake Bites**

Each year, nearly 8,000 people in the United States are bitten by poisonous snakes. Even a bite from a so-called "harmless" snake can cause infection or an allergic reaction in some people. Those who frequent wilderness areas, or who camp, hike, picnic, or live in or near a snake's natural habitat should be aware of the potential dangers posed by venomous snakes.

Some poisonous varieties commonly found in the U.S. include:

- rattlesnakes;
- copperheads;
- cottonmouths or water moccasins; and
- coral snakes.

### **What to Do in Case of a Snake Bite**

The American Red Cross recommends the following steps if someone is bitten by a snake:

- Call for emergency assistance immediately. Medical intervention for this type of an injury is crucial.
- Wash the bite with soap and water.
- A suction device can be placed over the bite to help draw the venom out of the wound without making cuts. These devices are often included in commercial snake bite kits.
- Apply a bandage, wrapped 2 to 4 inches above the bite, to help slow the spread of the venom. Do not wrap the bandage so tightly that it cuts off the flow of blood from a vein or artery. The bandage should be loose enough to slip a finger under it.
- Immobilize the bitten area and keep it lower than the heart.
- Cover the area with a clean, cool compress, moist dressing, or an ice pack to minimize swelling and discomfort until emergency personnel arrive. Don't apply ice directly to the skin — wrap the ice in a towel, piece of cloth, or some other material.
- Monitor the bite victim's vital signs (ABC).
- Treat for shock. If the victim seems confused, shivers or complains of being cold, seems unsteady or faint, or is breathing in short, rapid breaths, lay him down with

the head slightly lower than the trunk and, if possible, elevate the legs, and cover him with a coat or blanket.

Most often, physicians use an anti-venom called antivenin -- an antidote to snake venom -- to treat serious snake bites. Antivenin is derived from antibodies created in a horse's blood serum when the animal is injected with snake venom. Because antivenin is obtained from horses, snake bite victims sensitive to horse products must be carefully managed.

## Preventing Snake Bites

Some bites, such as those inflicted when you accidentally step on a snake in the woods, are nearly impossible to prevent. However, there are precautions everyone can take to reduce their chances of being bitten by a snake.

These include:

- Leave snakes alone. Many people are bitten because they try to kill a snake or get too close to it.
- Stay out of tall grass and vegetation unless you're wearing ankle-high, thick leather boots and other protection.
- Keep hands and feet out of areas you cannot see.
- If you see a snake nearby, do not pick up rocks or firewood unless you are well beyond its striking distance.
- Be cautious and alert when entering crawlspaces and while inspecting in areas that have tall vegetation, as well as areas around ponds and large rocks.

## Bee Stings

If you encounter bees or a hive, get away from the area quickly. Bees release a pheromone when in danger in order to attract other bees. If you're still around when the reinforcements arrive, they will probably sting you.



If you do get stung, remove any stingers immediately. There is no need to scrape off the bee stingers -- just remove them. It's OK to pull stingers out with your fingers. The longer the bee's stinger is allowed to remain in the body, the more severe the reaction will be.

If the victim is allergic to bees, check to see if he is carrying an epinephrine auto-injector (EpiPen®). If so, help him use the device as directed. If the victim is supposed to carry one of these devices and does not have it, call 911 immediately. Do not wait for symptoms to appear.

Watch any victim closely for signs of anaphylaxis, including:

- itching;
- redness;
- hives (raised welts); or
- shortness of breath.

If there is any concern that the victim may be developing anaphylaxis, call 911 immediately. Antihistamines, such as diphenhydramine (Benedryl®), can slow an anaphylactic reaction, but will not stop it.

Non-allergic victims will almost always develop local reactions to bee stings. Redness, swelling and pain are all common at the site of the bee sting. The pain will usually go away fairly quickly, but swelling may last for more than a day. Use an ice pack to reduce swelling at the site.

It's common to develop some itching at the bee sting site. Antihistamines or calamine lotion should help.

Seek medical intervention immediately if the victim was stung more than 10 times, or if there are bee stings inside the nose, mouth or throat. Swelling from these stings can cause shortness of breath, even in non-allergic victims.

Use ibuprofen or acetaminophen for minor pain relief. For tenderness at the site, try a bee-sting swab or alcohol swab to dull the pain.

## Tips

Conventional wisdom says to scrape bee stingers away from the skin because pinching the venom sack could push extra venom into the victim. In fact, how fast you get the stinger out is much more important than how it's removed.



Honey bees leave a stinger behind when they sting a victim. Wasps and hornets do not leave a stinger, and are capable of stinging a victim multiple times. These relatives of the honey bee can also cause an anaphylactic reaction.

## Minor Cuts and Scrapes

Minor cuts and scrapes usually don't require a trip to the emergency room. Yet proper care is essential to avoid infection and other complications. These guidelines can help you care for simple wounds.

### Stop the bleeding.

Minor cuts and scrapes usually stop bleeding on their own. If they don't, apply gentle pressure with a clean cloth or bandage. Hold the pressure continuously for 20 to 30

minutes. Don't keep checking to see if the bleeding has stopped because this may damage or dislodge the fresh clot that's forming and cause the bleeding to resume.

If the blood spurts or continues to flow after continuous pressure, seek medical assistance.

### **Clean the wound.**

Rinse out the wound with clear water. Soap can irritate the wound, so try to keep it out of the actual wound. If dirt or debris remain in the wound after washing, use tweezers cleaned with alcohol to remove the particles. If debris remain embedded in the wound after cleaning, seek medical help.



### **Thoroughly clean the wound to reduce the risk of tetanus.**

To clean the area around the wound, use soap and a washcloth. There's no need to use hydrogen peroxide, iodine or an iodine-containing cleanser. These substances irritate living cells. If you choose to use them, don't apply them directly on the wound.

### **Apply an antibiotic.**

After you clean the wound, apply a thin layer of an antibiotic cream or ointment, such as Neosporin®, bacitracin or other antibiotic product, to help keep the surface moist and to prevent infection. They can help prevent infection and allow the body's healing process to close the wound more efficiently.



### **Cover the wound.**

Bandages can help keep the wound clean and keep harmful bacteria out. After the wound has healed enough to make infection unlikely, exposure to the air will speed the healing process.

### **Change the dressing often.**

Change the dressing at least daily or whenever it becomes wet or dirty. If you're allergic to the adhesive used in most bandages, switch to adhesive-free dressings or sterile gauze held in place with paper tape, gauze roll, or a loosely applied elastic bandage. These supplies are available at pharmacies.

## **Get stitches for deep wounds.**

A wound that cuts deeply through the skin or is gaping or jagged-edged and has fat or muscle protruding usually requires stitches. A strip or two of surgical tape may hold a minor cut together, but if you can't easily close the wound, seek medical assistance as soon as possible. Proper closure within a few hours minimizes the risk of infection.

Watch for signs of infection. Seek medical help if the wound isn't healing or if you notice any redness, drainage, warmth or swelling.

## **When to Get a Tetanus Shot**

Doctors recommend that you get a tetanus shot every 10 years. If your wound is deep or dirty and your last shot was more than five years ago, your doctor may recommend a tetanus shot booster. Get the booster within 48 hours of the injury.

# **Quiz 13**

A concussion is a type of \_\_\_\_\_.

- closed-head injury
- skull fracture
- burn

If an injury victim is faint or is breathing in short, rapid breaths, it may be an indication that he \_\_\_\_\_.

- is going into shock
- is bleeding
- has broken a bone

After being bitten by a snake and the victim is losing coordination, \_\_\_\_\_.

- it may be an indication that the snake was poisonous
- give the victim plenty of water
- place an ice pack on the person's head

Skin that turns blue following an injury may be an indication \_\_\_\_\_.

- of a broken bone
- of low blood pressure
- that the person has developed frostbite

Doctors recommend getting a tetanus shot every \_\_\_\_ years.

- 10
- five
- 15

T/F: Dog bites are more common than cat bites, but cat bites are more likely to become infected.

- True
- False

T/F: Bees release a pheromone when in danger in order to attract other bees.

- True
- False

T/F: Wasps and hornets do not leave a stinger, and can sting a victim multiple times.

- True
- False

If a day-old wound displays increased swelling or redness, or feels warm to the touch, it may be an indication of \_\_\_\_\_.

- infection
- a broken bone
- delayed healing

Puncture wounds can be cause for concern because they are \_\_\_\_\_.

- prone to infection
- small
- painful

Electrical burns can be serious because the injury \_\_\_\_\_.

- can extend deep into the tissue beneath the skin
- is like a bad sunburn
- always appears charred