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A collection of OSHA Quick Cards and Fact Sheets related to hazards associated with construction, demolition, and cleanup.

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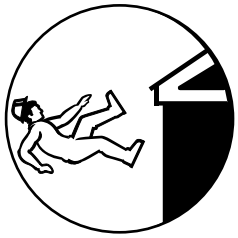
Top Four
Construction Hazards

The top four causes of construction fatalities are: Falls, Struck-By, Caught-In/Between and Electrocutions.



Prevent Falls

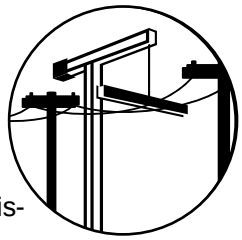
- Wear and use personal fall arrest equipment.
- Install and maintain perimeter protection.
- Cover and secure floor openings and label floor opening covers.
- Use ladders and scaffolds safely.

Prevent Struck-By

- Never position yourself between moving and fixed objects.
- Wear high-visibility clothes near equipment/vehicles.

Prevent Caught-In/Between

- Never enter an unprotected trench or excavation 5 feet or deeper without an adequate protective system in place; some trenches under 5 feet deep may also need such a system.
- Make sure the trench or excavation is protected either by sloping, shoring, benching or trench shield systems.



Prevent Electrocutions

- Locate and identify utilities before starting work.
- Look for overhead power lines when operating any equipment.
- Maintain a safe distance away from power lines; learn the safe distance requirements.
- Do not operate portable electric tools unless they are grounded or double insulated.
- Use ground-fault circuit interrupters for protection.
- Be alert to electrical hazards when working with ladders, scaffolds or other platforms.

For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA

OSHA 3216-6N-06

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Supported Scaffold Safety

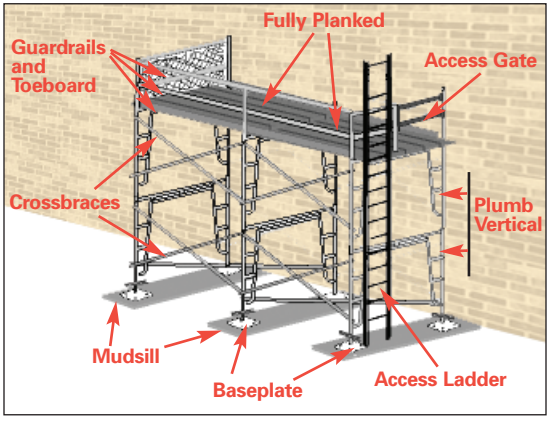
Supported scaffolds consist of one or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support.

Guardrails or personal fall arrest systems for fall prevention/protection are required for workers on platforms 10 feet or higher.

Working platforms/decks must be planked close to the guardrails.

Planks are to be overlapped on a support at least 6 inches, but not more than 12 inches.

Legs, posts, frames, poles, and uprights must be on base plates and mud sills, or a firm foundation; and, be properly aligned and braced.



Scaffold user training must include:

- The hazards of type of scaffold being used;
- Maximum intended load and capacity;
- Recognizing and reporting defects;
- Fall hazards;
- Electrical hazards including overhead lines;
- Falling object hazards;
- Other hazards that may be encountered.

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OSHA 3242-10-05

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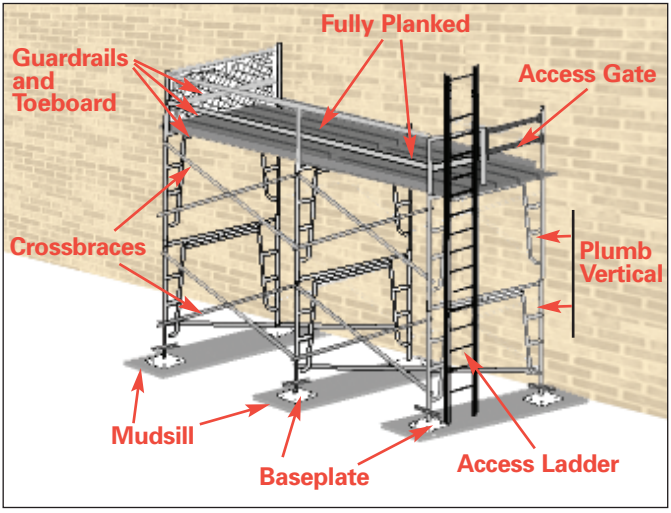
Supported Scaffold Inspections

Inspect scaffolds and scaffold parts daily, before each work shift, and after any event that may have caused damage.

- Check to see if power lines near scaffolds are deenergized or that the scaffolds are at least 10 feet away from energized power lines.
- Make sure that tools and materials are at least 10 feet away from energized power lines.
- Verify that the scaffold is the correct type for the loads, materials, workers and weather conditions.
- Check footings to see if they are level, sound, rigid, and capable of supporting the loaded scaffold.



- Check legs, posts, frames and uprights to see if they are on baseplates and mudsills.
- Check metal components for bends, cracks, holes, rust, welding splatter, pits, broken welds, and non-compatible parts.
- Check for safe access. Do not use the crossbraces as a ladder for access or exit.

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OSHA 3318-09-06

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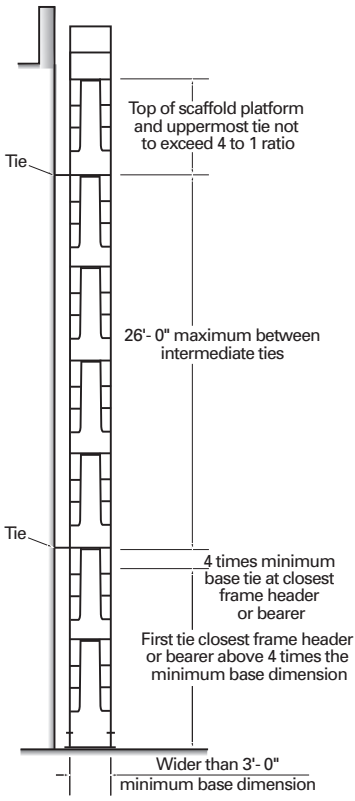
- Check wooden planks for cracks, splits greater than 1/4 inch, end splits that are long, many large loose knots, warps greater than 1/4 inch, boards and ends with gouges, mold, separated laminate(s), and grain sloping greater than 1 in 12 inches from the long edge and are scaffold grade lumber or equivalent.
- If the planks deflect 1/60 of the span or 2 inches in a 10-foot wooden plank, the plank has been damaged and must not be used.
- Check to see if the planks are close together, with spaces no more than 1 inch around uprights.
- Check to see if 10-foot or shorter planks are 6 to 12 inches over the center line of the support, and that 10-foot or longer planks are no more than 18 inches over the end.
- Check to see if the platform is 14 inches or less from the wall or 18 inches or less away if plastering/stucco.
- Check for guardrails and midrails on platforms where work is being done.
- Check for workers under the platform and provide falling object protection or barricade the area. Make sure that hard hats are worn.
- Use braces, tie-ins and guying as described by the scaffold's manufacturer at each end, vertically and horizontally to prevent tipping.

Maximum Vertical Tie Spacing Wider Than 3'- 0" Bases



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OSHA® FactSheet

Trenching and Excavation Safety

Two workers are killed every month in trench collapses. The employer must provide a workplace free of recognized hazards that may cause serious injury or death. The employer must comply with the trenching and excavation requirements of 29 CFR 1926.651 and 1926.652 or comparable OSHA-approved state plan requirements.

An excavation is any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.

Trench (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 meters).

Dangers of Trenching and Excavation

Cave-ins pose the greatest risk and are much more likely than other excavation-related accidents to result in worker fatalities. Other potential hazards include falls, falling loads, hazardous atmospheres, and incidents involving mobile equipment. One cubic yard of soil can weigh as much as a car. An unprotected trench is an early grave. Do not enter an unprotected trench.

Trench Safety Measures

Trenches 5 feet (1.5 meters) deep or greater require a protective system unless the excavation is made entirely in stable rock. If less than 5 feet deep, a competent person may determine that a protective system is not required.

Trenches 20 feet (6.1 meters) deep or greater require that the protective system be designed by a registered professional engineer or be based on tabulated data prepared and/or approved by a registered professional engineer in accordance with 1926.652(b) and (c).

Competent Person

OSHA standards require that employers inspect trenches daily and as conditions change by a competent person before worker entry to ensure elimination of excavation hazards. A competent person is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to workers, soil types and protective systems required, and who is authorized to take prompt corrective measures to eliminate these hazards and conditions.

Access and Egress

OSHA standards require safe access and egress to all excavations, including ladders, steps, ramps, or other safe means of exit for employees working in trench excavations 4 feet (1.22 meters) or deeper. These devices must be located within 25 feet (7.6 meters) of all workers.

General Trenching and Excavation Rules

- Keep heavy equipment away from trench edges.
- Identify other sources that might affect trench stability.
- Keep excavated soil (spoils) and other materials at least 2 feet (0.6 meters) from trench edges.
- Know where underground utilities are located before digging.
- Test for atmospheric hazards such as low oxygen, hazardous fumes and toxic gases when > 4 feet deep.
- Inspect trenches at the start of each shift.
- Inspect trenches following a rainstorm or other water intrusion.
- Do not work under suspended or raised loads and materials.
- Inspect trenches after any occurrence that could have changed conditions in the trench.
- Ensure that personnel wear high visibility or other suitable clothing when exposed to vehicular traffic.

Protective Systems

There are different types of protective systems.

Benching means a method of protecting workers from cave-ins by excavating the sides of an

excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels. *Benching cannot be done in Type C soil.*

Sloping involves cutting back the trench wall at an angle inclined away from the excavation.

Shoring requires installing aluminum hydraulic or other types of supports to prevent soil movement and cave-ins.

Shielding protects workers by using trench boxes or other types of supports to prevent soil cave-ins. Designing a protective system can be complex because you must consider many factors: soil classification, depth of cut, water content of soil, changes caused by weather or climate, surcharge loads (e.g., spoil, other materials to be used in the trench) and other operations in the vicinity.

Additional Information

Visit OSHA's Safety and Health Topics web page on trenching and excavation at
www.osha.gov/SLTC/trenchingexcavation/index.html
www.osha.gov/dcsp/statestandard.html

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For assistance, contact us. We can help. It's confidential.

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DOC FS-3476 9/2011

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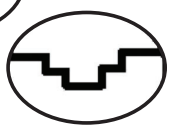
Working Safely in Trenches

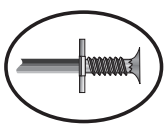
Two workers are killed every month in trench collapses. Each worker in a trench shall be protected from a cave-in by an adequate protective system. Some of the protective systems for trenches are:

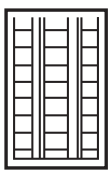
- Sloped for stability; or

- Cut to create stepped benched grades (Type A or B soil only); or

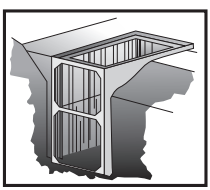


- Supported by a system made with materials such as posts, beams, shores or planking and hydraulic jacks; or

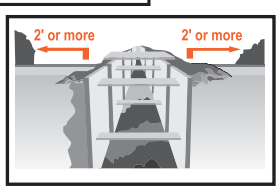




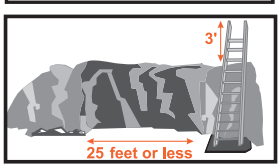
- Shielded by a trench box to protect workers in a trench.



Excavated or other materials and equipment must be at least 2 feet back from the edge of a trench; and



A safe way to exit must be provided within 25 feet of workers in a trench.



A competent person must inspect trenches daily and when conditions change. An unprotected trench is an early grave. Do not enter an unprotected trench.

For more information:

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TTY (887) 889-5627

OSHA 3243-09R-11

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Demolition Safety

Demolition work involves many of the same hazards that arise during other construction activities. However, demolition also involves additional hazards due to a variety of other factors. Some of these include: lead-based paint, sharp or protruding objects and asbestos-containing material.

- Brace or shore up the walls and floors of structures which have been damaged and which employees must enter.
- Inspect personal protective equipment (PPE) before use.
- Select, wear and use appropriate PPE for the task.
- Inspect all stairs, passageways, and ladders; illuminate all stairways.
- Shut off or cap all electric, gas, water, steam, sewer, and other service lines; notify appropriate utility companies.
- Guard wall openings to a height of 42 inches; cover and secure floor openings with material able to withstand the loads likely to be imposed.
- Floor openings used for material disposal must not be more than 25% of the total floor area.
- Use enclosed chutes with gates on the discharge end to drop demolition material to the ground or into debris containers.
- Demolition of exterior walls and floors must begin at the top of the structure and proceed downward.
- Structural or load-supporting members on any floor must not be cut or removed until all stories above that floor have been removed.
- All roof cornices or other ornamental stonework must be removed prior to pulling walls down.
- Employees must not be permitted to work where structural collapse hazards exist until they are corrected by shoring, bracing, or other effective means.

For more complete information:

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OSHA 3290-11N-05

OSHA FactSheet

Demolition and Cleanup

Before starting a demolition, the person or persons in charge must adequately prepare for the task with regard to the health and safety of the workers. These preparatory operations involve the overall planning of the demolition job, including the methods to be used to bring the structure down, the equipment necessary to do the job, and the measures to be taken to perform the work safely. Before doing demolition work, inspect available personal protective equipment (PPE), and select, wear and use the PPE appropriate for the task.

Demolition work involves many of the same hazards associated with construction work. However, demolition also poses additional hazards due to unknown factors such as: deviations from the structure's original design, approved or unapproved modifications that altered the original design, materials hidden within structural members, and unknown strengths or weaknesses of damaged materials. To counter these unknowns, all personnel involved in a demolition project need to be fully aware of these types of hazards and the safety precautions available to control these hazards.

Preliminary Tasks

A written engineering survey must be performed on each structure being considered for demolition to determine the condition of the framing, floors and walls, and to assess the possibility of an unplanned collapse of any portion of the structure. Brace or shore the walls and floors of structures which have been damaged and which employees must enter. Inspect and maintain all stairs, passageways and ladders. Properly illuminate all stairways.

Shut off or cap all electric, gas, water, steam, sewer and other service lines outside the building line. Notify appropriate utility companies. Temporarily relocate and protect any essential power, water, or other utilities.

Determine the types of hazardous chemicals, gases, explosives, and flammable materials which have been used in any pipes, tanks, or other equipment on the property. Test and purge the hazardous chemicals, gases, explosives, or flammable materials. Survey for asbestos or other hazardous materials.

Guard wall openings to a height of 42 inches. Cover and secure floor openings with material able to withstand the loads likely to be imposed. Debris dropped through holes in the floor without the use of chutes must be completely enclosed with barricades not less than 42 inches high and not less than 6 feet back from the projected edge of the opening above. Floor openings used for material disposal must not be more than 25% of the total floor area. Use enclosed chutes with gates on the discharge end to drop material to the ground. Design and construct chutes that will withstand the loads likely to be imposed without failing.

Post signs at each level of structures, warning of the hazard of falling materials. Protect entrances to multi-story structures with sidewalk sheds or canopies for a minimum of 8 feet. Canopies must be at least 2 feet wider than the structure entrance and be able to hold a load of 150 lbs./sq. ft. Storage of material and debris must not exceed the allowable floor load.

Removing Walls and Masonry Sections

Demolition of exterior walls and floors must begin at the top of the structure and proceed downward. Masonry walls must not be permitted to fall on the floors of a building in

masses that would exceed the safe carrying capacities of the floors.
No wall section, one story in height or higher, shall be permitted to stand alone without lateral bracing, unless such a wall was originally designed and constructed to stand without such lateral support, and is safe enough to be self-supporting. All walls must be left in a stable condition at the end of each work shift. Employees shall not work on the top of a wall when weather conditions create a hazard.

Structural or load-supporting members on any floor must not be cut or removed until all stories above such a floor have been removed. In buildings of "skeleton-steel" construction, the steel framing may be left in place during the demolition of masonry. Walkways or ladders must be provided to enable workers to safely reach or leave any scaffold or wall. Walls, which serve as retaining walls to support earth or adjoining structures, must not be demolished until the supporting earth has been properly braced or until adjoining structures have been properly underpinned. Walls, which will serve as retaining walls against which debris will be piled, must not be used unless they are capable of supporting the imposed load. Dismantle steel construction column length by column length, and tier by tier.

Mechanical Demolition

No workers shall be permitted in any area when using a crane's headache ball or clamshell to remove debris. Only those workers necessary to perform such operations must be permitted in this work area at any time. The weight of the demolition ball must not exceed 50 percent of the crane's rated load. The crane boom and loadline must be as short as possible. The ball must be attached to the loadline with a swivel-type connection to prevent twisting of the loadline, and it must be attached by positive means in such a manner that the weight cannot become accidentally disconnected.

When pulling over walls or portions thereof, all steel members affected must have previously been cut free. All roof cornices or other such ornamental stonework must be removed prior to pulling walls over. During demolition, continuing inspections by a competent person shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, or walls, or loosened material. No employee shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

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For more complete information:

OSHA Occupational Safety and Health Administration

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(800) 321-OSHA

DOC 10/2005

OSHA FactSheet

Protecting Workers from Asbestos Hazards

Cleaning up after a flood requires hundreds of workers to renovate and repair, or tear down and dispose of, damaged or destroyed structures and materials. However, repair, renovation, and demolition operations often generate airborne asbestos, a mineral fiber that can cause chronic lung disease or cancer. The Occupational Safety and Health Administration (OSHA) has developed regulations designed to protect cleanup workers from asbestos hazards.

How You Can Become Exposed to Asbestos

Before it was known that inhalation of asbestos fibers causes several deadly diseases—including asbestosis, a progressive and often fatal lung disease, and lung and other cancers—asbestos was used in a large number of building materials and other products because of its strength, flame resistance, and insulating properties. Asbestos was used in asbestos-cement pipe and sheeting, floor and roofing felts, dry wall, floor tiles, spray on ceiling coatings, and packing materials. When buildings containing these materials are renovated or torn down, or when the asbestos-containing materials themselves are disturbed, minute asbestos fibers may be released into the air. The fibers are so small that they often cannot be seen with the naked eye; the fact that you can inhale these fibers without knowing it makes asbestos an even more dangerous hazard.

OSHA's Standards for Asbestos

The work of flood cleanup personnel involves the repair, renovation, removal, demolition, or salvage of flood-damaged structures and materials. Such materials may contain or be covered with asbestos, and cleanup personnel are protected by OSHA's construction industry asbestos standard (Title 29 Code of Federal Regulations (CFR), Part 1926.1101). This standard requires employers to follow various procedures to protect their employees from inhaling asbestos fibers. The standard contains many requirements that vary depending on the kind of work being undertaken, the amount of asbestos in the air, and other factors. You and your employer can obtain a copy of this standard and the booklet, Asbestos Standards for Construction (OSHA 3096) describing how to comply with it, from OSHA Publications, P.O. Box 37535, Washington, DC 20013-7535, (202) 693-1888(phone), or (202) 693-2498(fax); or visit OSHA's website at www.osha.gov.

Major Elements of OSHA's Asbestos Standard

The following include some of the major requirements of the asbestos standard. For complete information on all requirements, see 29 CFR 1926.1101.

- A permissible exposure limit (PEL) of 0.1 fiber of asbestos per cubic centimeter of air as averaged over an 8-hour period, with an excursion limit of 1.0 asbestos fibers per cubic centimeter over a 30-minute period.
- Requirements for an initial exposure assessment to ascertain expected exposures during that work operation, and periodic exposure monitoring in certain instances.
- Use of engineering controls, to the extent feasible, to meet the PEL. Where this is not possible, engineering controls must be used to reduce exposures to the lowest levels possible and then supplemented by the use of appropriate respiratory protection.

- Use of regulated areas to limit access to locations where asbestos concentrations may be dangerously high.
- No smoking, eating, or drinking in asbestos-regulated areas.
- Requirements for warning signs and caution labels to identify and communicate the presence of hazards and hazardous materials; recordkeeping; and medical surveillance.

Additional Information

For more information on this, and other health-related issues impacting workers, visit OSHA's Web site at www.osha.gov.

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For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

DSTM 9/2005

OSHA FactSheet

Protecting Workers from Lead Hazards

Cleaning up after a flood requires hundreds of workers to renovate and repair, or tear down and dispose of, damaged or destroyed structures and materials. Repair, renovation and demolition operations often generate dangerous airborne concentrations of lead, a metal that can cause damage to the nervous system, kidneys, blood forming organs, and reproductive system if inhaled or ingested in dangerous quantities. The Occupational Safety and Health Administration (OSHA) has developed regulations designed to protect workers involved in construction activities from the hazards of lead exposure.

How You Can Become Exposed to Lead

Lead is an ingredient in thousands of products widely used throughout industry, including lead-based paints, lead solder, electrical fittings and conduits, tank linings, plumbing fixtures, and many metal alloys. Although many uses of lead have been banned, lead-based paints continue to be used on bridges, railways, ships, and other steel structures because of its rust- and corrosion-inhibiting properties. Also, many homes were painted with lead-containing paints. Significant lead exposures can also occur when paint is removed from surfaces previously covered with lead-based paint.

Operations that can generate lead dust and fumes include:

- Demolition of structures;
- Flame-torch cutting;
- Welding;
- Use of heat guns, sanders, scrapers, or grinders to remove lead paint; and
- Abrasive blasting of steel structures

OSHA has regulations governing construction worker exposure to lead. Employers of construction workers engaged in the repair, renovation, removal, demolition, and salvage of flood-damaged structures and materials are responsible for the development and implementation of a worker protection program in accordance with Title 29 Code of Federal Regulations (CFR), Part 1926.62. This program is essential to minimize worker risk of lead exposure. Construction projects vary in their scope and potential for exposing workers to lead and other hazards. Many projects involve only limited exposure, such as the removal of paint from a few interior residential surfaces, while others may involve substantial exposures. Employers must be in compliance with OSHA's lead standard at all times. A copy of the standard and a brochure — Lead in Construction (OSHA 3142) — describing how to comply with it, are available from OSHA Publications, P.O. Box 37535, Washington, D.C. 20013-7535, (202) 693-1888(phone), or (202) 693-2498(fax); or visit OSHA's website at www.osha.gov.

Major Elements of OSHA's Lead Standard

- A permissible exposure limit (PEL) of 50 micrograms of lead per cubic meter of air, as averaged over an 8-hour period.
- Requirements that employers use engineering controls and work practices, where feasible, to reduce worker exposure.
- Requirements that employees observe good personal hygiene practices, such as washing hands before eating and taking a shower before leaving the worksite.
- Requirements that employees be provided with protective clothing and, where necessary, with respiratory protection accordance with 29 CFR 1910.134.

- A requirement that employees exposed to high levels of lead be enrolled in a medical surveillance program.

Additional Information

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OSHA Occupational Safety and Health Administration

U.S. Department of Labor

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Protect Yourself

Lead in Construction

Lead is a common hazardous element found at many construction sites. Lead exposure comes from inhaling fumes and dust, and lead can be ingested when hands are contaminated by lead dust. Lead can be taken home on workers' clothes, skin, hair, tools and in vehicles.

Lead exposure may take place in demolition, salvage, removal, encapsulation, renovation and cleanup activities.

Avoid Exposure

- Use proper personal protective equipment (e.g., gloves, clothing and approved respirators).
- Wash hands and face after work and before eating.
- Never enter eating areas wearing protective equipment.
- Never wear clothes and shoes that were worn during lead exposure away from work.
- Launder clothing daily; use proper cleaning methods.
- Be alert to symptoms of lead exposure (e.g., severe abdominal pain, headaches, loss of motor coordination).

Use Respirators

- Wear appropriate respirators as directed.
- Conduct a user seal check each time a respirator is donned.
- Be aware of your company's respiratory protection program; understand the limitations and potential hazards of respirators.

Prevent Further Exposure

- Ensure adequate ventilation.
  - When outdoors, stand upwind of any plume.
- Use dust collecting equipment, when possible.
- Use lead-free materials and chemicals.
- Use wet methods to decrease dust.
- Use local exhaust ventilation for enclosed work areas.

For more complete information:

OSHA Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov (800) 321-OSHA

OSHA 3291-10-05

OSHA FactSheet

Preventing Falls

Falls and falling objects can result from unstable working surfaces, ladders that are not safely positioned, and misuse of fall protection. Workers are also subject to falls or to the dangers of falling objects if sides and edges, floor holes, and wall openings are not protected. Any time a worker is at a height of six feet or more (construction industry) or four feet or more (general industry), the worker must be protected.

Fall Protection

Fall protection must be provided for each employee on a walking/working surface with an unprotected side or edge at the height required by the OSHA standard applicable to their work environment. Management is required to:

- Develop, implement and commit to a fall protection program
- Provide training on the fall protection program
- Evaluate the program on a regular basis to insure the program's effectiveness and determine whether it needs to be changed or updated

Employers are required to assess the workplace to determine if the walking/working surfaces on which employees are to work have the strength and structural integrity to safely support workers. Once employers have determined that the surface is safe for employees to work on, the employer must select one of the options listed for the work operation if a fall hazard is present.

- Where protection is required, select fall protection systems appropriate for given situations.
- Use proper construction and installation of safety systems.
- Supervise employees properly.
- Train workers in the proper selection, use, and maintenance of fall protection systems.

Unprotected Sides, Wall Openings, and Floor Holes

Almost all sites have unprotected sides and edges, wall openings, or floor holes at some point during construction. If these sides and openings are not protected at your site, injuries from falls or falling objects may result, ranging from sprains and concussions to death.

- Use at least one of the following whenever employees are exposed to a fall of 6 feet or more [see comment above] above a lower level:
- Guardrail Systems
- Safety Net Systems
- Fall Arrest Systems
- Cover or guard floor holes as soon as they are created.
- Guard or cover any openings or holes immediately.
- Construct all floor hole covers so they will effectively support two times the weight of employees, equipment, and materials that may be imposed on the cover at any one time.
- In general, it is better to use fall prevention systems, such as guardrails, than fall protection systems, such as safety nets or fall arrest devices.

Ladders

You risk falling if portable ladders are not safely positioned each time they are used. While you are on a ladder, it may move and slip from its supports. You can also lose your balance while getting on or off an unsteady ladder. Falls from ladders can cause injuries ranging from sprains to death.

- Position portable ladders so the side rails extend at least 3 feet above the landing
- Secure side rails at the top to a rigid support and use a grab device when 3 foot extension is not possible.
- Make sure that the weight on the ladder will not cause it to slip off its support.
- Before each use, inspect ladders for cracked, broken, or defective parts.
- Do not apply more weight on the ladder than it is designed to support.
- Use only ladders that comply with OSHA standards.

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Think Safety!

For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

OSHA® FactSheet

Fall Protection in Residential Construction

The United States Department of Labor's Occupational Safety and Health Administration (OSHA) has issued a directive rescinding the Interim Fall Protection Compliance Guidelines for Residential Construction (STD 03-00-001).

Before issuance of this new directive, STD 03-00-001 allowed employers engaged in certain residential construction activities to use specified alternative methods of fall protection (e.g., slide guards or safety monitor systems) rather than the conventional fall protection (guardrails, safety nets, or personal fall arrest systems) required by the residential construction fall protection standard (29 CFR 1926.501(b)(13)). Employers could use the alternative measures described in STD 03-00-001 without first proving that the use of conventional fall protection was infeasible or created a greater hazard and without a written fall protection plan.

With the issuance of the new directive, all residential construction employers must comply with 29 CFR 1926.501(b)(13).

- Residential construction employers generally must ensure that employees working six feet or more above lower levels use guardrails, safety nets, or personal fall arrest systems. A personal fall arrest system may consist of a full body harness, a deceleration device, a lanyard, and an anchor point. (See the definition of "personal fall arrest system" in 29 CFR 1926.500.)
  - Other fall protection measures may be used to the extent allowed under other provisions of 29 CFR 1926.501(b) addressing specific types of work. For example, 1926.501(b)(10) permits the use of warning lines and safety monitoring systems during the performance of roofing work on low-sloped roofs.
  - OSHA allows the use of an effective fall restraint system in lieu of a personal fall arrest system. To be effective, a fall restraint system must be rigged to prevent a worker from reaching a fall hazard and falling over the edge. A fall restraint system may consist of a full body harness or body belt that is connected to an anchor point at the center of a roof by a lanyard of a length that will not allow a worker to physically reach the edge of the roof.
- If the employer can demonstrate that use of conventional fall protection methods is infeasible or creates a greater hazard, it must ensure that a qualified person:
  - Creates a written, site-specific fall protection plan in compliance with 29 CFR 1926.502(k); *and*
  - Documents, in that plan, the reasons why conventional fall protection systems are infeasible or why their use would create a greater hazard.

The new directive interprets "residential construction" as construction work that satisfies both of the following elements:

- The end-use of the structure being built must be as a home, i.e., a dwelling.
- The structure being built must be constructed using traditional wood frame construction materials and methods. The limited use of structural steel in a predominantly wood-framed home, such as a steel I-beam to help support wood framing, does not disqualify a structure from being considered residential construction.
  - Traditional wood frame construction materials and methods will be characterized by:
    - *Framing materials:* Wood (or equivalent cold-formed sheet metal stud) framing, not steel or concrete; wooden floor joists and roof structures.
    - *Exterior wall structure*: Wood (or equivalent cold-formed sheet metal stud) framing or masonry brick or block.
    - *Methods*: Traditional wood frame construction techniques.

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For more complete information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor
www.osha.gov
(800) 321-OSHA

12/2010

OSHA® QUICK CARD™

Fall Protection in General Industry

Falls are among the most common causes of serious work-related injuries and deaths. Employers must take measures in their workplaces to prevent employees from falling off overhead platforms, elevated work stations or into holes in the floor and walls.

Raised platform with protected guardrail.

To prevent employees from being injured from falls, employers must:

- Guard every floor hole into which a worker can accidentally walk by use of a railing and toeboard or a floor hole cover.
- Provide a guardrail and toeboard around every open-sided platform, floor or runway that is 4 feet or higher off the ground or next level.
- Regardless of height, if a worker can fall into or onto dangerous machines or equipment (such as a vat of acid or a conveyor belt), employers must provide guardrails and toeboards to prevent workers from falling and getting injured.
- Other means of fall protection that may be required on certain jobs include safety harness and line, safety nets, stair railings and handrails.

OSHA requires employers to:

- Provide working conditions that are free of known dangers.
- Keep floors in work areas in a clean and sanitary condition.
- Select and provide required personal protective equipment at no cost to workers.
- Train workers about job hazards in a language that they can understand.

You have a right to a safe workplace.

If you have questions about workplace safety and health, call OSHA at 1-800-321-6742.

It's confidential.

We can help!

For more complete information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA (6742)

OSHA 3257-12-10R

OSHA® FactSheet

Reducing Falls During Residential Construction: Installing Roof Trusses

Every year, residential construction workers experience numerous fatal injuries due to falls. Installing roof trusses presents several challenges for protecting workers from these falls. This fact sheet highlights some of the hazards of truss installation and lists some practical methods that employers can use to protect workers who install trusses.

Risks During Truss Installation

Accidental falls are the leading cause of death for construction workers and installing roof trusses can be particularly dangerous for two reasons: (1) truss construction usually occurs high above the ground and (2) trusses are not stable until they are properly restrained and braced.

Roof trusses are the highest part of a house frame, so residential construction workers installing them can fall and be seriously injured or even killed. Although personal fall arrest systems (PFAS) are the most widely used form of fall protection in residential construction, they might not be suitable when workers begin installing roof truss sections because there may not be a stable place to attach an anchor. Trusses are designed to support weight from the top down. Until trusses are properly restrained and braced, they are weak if pulled from the side (i.e., subjected to lateral force) as can occur when a truss-mounted fall protection system bears the full weight of a falling worker.

PFAS need strong anchor points that can hold the sudden weight of a falling worker. No anchor with a single connection point, such as a strap anchor or a bolt-on anchor, will protect a falling worker who is attached to a single truss.

Other systems, such as scaffolds, lifts and ladders can be used to protect workers until a fully interconnected, multi-truss section has been appropriately braced and secured.

OSHA requires fall protection measures for residential construction activities 6 feet or more above lower levels. As a result, employers must plan ahead to ensure they have the right systems in place, and that all workers are properly trained before the job begins.

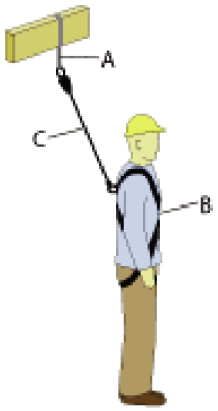
Personal Fall Arrest System (PFAS)

A PFAS is designed to safely stop a fall before the worker strikes a lower level. It includes three major components:

A. An ***anchorage*** to which the other components of the PFAS are rigged.

B. A full body ***harness*** worn by the worker.

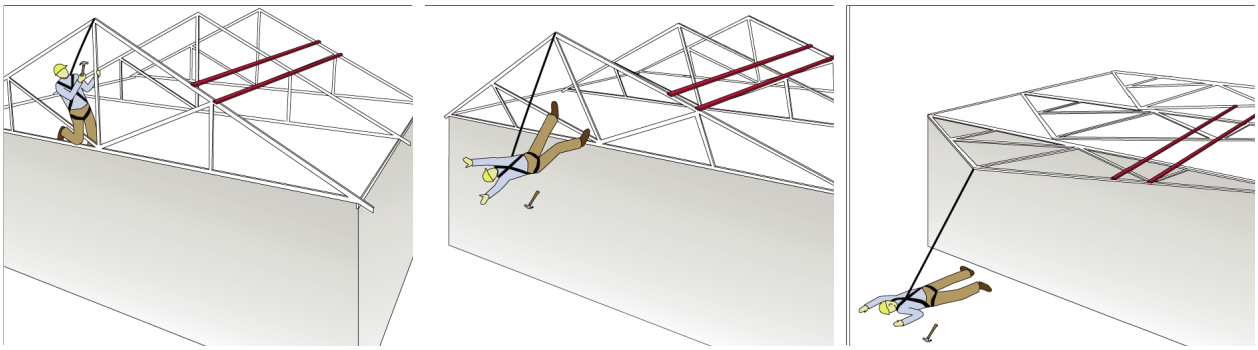
C. A connector, such as a ***lanyard or lifeline***, linking the harness to the anchorage. A rip-stitch lanyard, or deceleration device, is typically a part of the system.



For more information on the requirements for a PFAS, refer to 29 CFR 1926.502(d).

Remember that for fall arrest systems, workers must use full-body harnesses. Body belts can cause serious injury during a fall and so OSHA prohibits their use as part of fall arrest systems.

If a worker falls while using a single truss as an anchor point, the whole truss assembly can collapse. Such a structural failure puts workers' lives and entire buildings at risk.



How to Reduce Risks

During Initial Truss Installation

Guardrails, nets, or PFAS (conventional fall protection) may not be practical for all phases of truss installation. Instead, employers should plan to use other methods, such as ground assembly, scaffolds, aerial lifts, or ladders to keep workers safe.

Ground assembly: By assembling a truss section on the ground, employers can greatly reduce the risk of falls for workers. A section of trusses can be sheathed while still on the ground. Peak anchors and lifelines can be pre-installed before the section is lifted into place. Many builders find it efficient to pre-assemble truss sections on the ground and then lift them with a crane so that workers can secure the section to the building frame.

Lifts: Depending on the building layout and the tasks involved, lifts (e.g., aerial, scissor) may be options for setting trusses. Lifts provide a stable, elevated platform from which workers can operate. Workers must follow all safety procedures and conduct all operations from inside the lift basket. For other requirements for using lifts, refer to 29 CFR 1926.453, Aerial Lifts.

Scaffolds: When properly constructed and used, internal and external scaffolds can provide suitable protection for truss-setting tasks. For example, bracket scaffolds placed on the inside or outside of a building provide large, stable walking and working areas for workers. To ensure safe use and appropriate load limits for bracket scaffold systems, workers should always follow the manufacturer's instructions or consult a qualified person. For other requirements for scaffolds, refer to 29 CFR 1926 Subpart L, Scaffolds.

Ladders: For certain truss-setting jobs, platform and stepladders can provide a stable work platform for workers. They can be particularly helpful when set up inside a building. Workers should always use a ladder safely by following the requirements spelled out in 29 CFR 1926 Subpart X, Stairways and Ladders.

Spreader: An engineered spreader, when installed in accordance with the manufacturer's instructions, distributes the force of a PFAS across multiple trusses. The roof trusses do not need to be sheathed to use a spreader. These engineered anchorage devices are reusable and can be uninstalled and reinstalled quickly. ***A qualified person should decide if the spreader is suitable for use as an anchor.***

After a Complete Truss Section Is Fully Installed

Once the assembled truss section has been set and secured, it can be used as an attachment point for an anchorage device. From this point on, PFAS can be used to protect workers while they install additional trusses and roof sheathing.

Truss Section
Multiple (typically four) individual trusses that are interconnected and fully sheathed. A truss section that has been restrained, braced and sheathed in accordance with the manufacturer's instructions can provide a suitable structure to establish an anchor point.

Anchors: Fixed anchors provide a secure point where workers can tie off their lifelines as part of a PFAS. Anchors for a PFAS must meet the 5,000-pound strength requirement or maintain a safety factor of at least two under the supervision of a qualified person -29 CFR 1926.502(d)(15). See 29

CFR 1926 Subpart M, Fall Protection for more information and additional requirements.

Different types of anchors for these systems include, but are not limited to:

- Peak anchors
- Strap anchors
- Bolt-on anchors

Once a group of trusses has been properly restrained and braced, a roof peak anchor can provide a usable tie-off point for a lifeline. Multiple peak anchors and lifelines can protect several workers. After confirmation from the manufacturer, some peak anchors may be strong enough to serve as tie-off points for two lifelines. Peak anchors can also be useful for fall protection during later roofing tasks or while setting another truss section.

Written Fall Protection Plans

If the employer does not use ladders, scaffolds, or aerial lifts, and can demonstrate that it is not feasible or would create a greater hazard to use conventional fall protection equipment (guardrails, safety nets, or PFAS) when working at heights of 6 feet or greater, the employer must develop a written site-specific fall protection plan in accord with 29 CFR 1926.502(k). The plan must be prepared by a qualified person as defined by 29 CFR 1926.32(m). This person could be the owner, the supervisor, or a worker who has extensive knowledge, training and experience with fall protection and is able to solve problems relating to fall protection. States with OSHA-approved State Plans may have additional requirements for written fall protection plans.

The site-specific fall protection plan must document at each location why the use of conventional fall protection equipment is not feasible or will create a greater hazard. The plan must also describe the alternative methods that the employer will use so that workers are protected from falls. Workers and their supervisors must be trained on the proper use of those other fall protection methods.

Conventional fall protection equipment can reduce or eliminate the chances of a fatal fall. Written site-specific fall protection plans ensure that protection continues, even when conventional fall protection methods are determined to not be feasible.

OSHA standard:

29 CFR 1926 Subpart M – Fall Protection

Available online at
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10922

OSHA Residential Fall Protection Web Page
http://www.osha.gov/doc/residential_fall_protection.html

OSHA Compliance Guidance:

Compliance Guidance for Residential Construction – STD 03-11-002 (dated 12/16/2010)

Available online at
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=4755

State Plan Guidance: States with OSHA-approved State Plans may have additional requirements for Residential Roofing within State Plans. For more information on these requirements, please visit: http://www.osha.gov/dcsp/osp/statestandards.html.

Help for Employers: OSHA's On-site Consultation Program offers free and confidential advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites. On-site Consultation services are separate from enforcement and do not result in penalties or citations. Consultants from state agencies or universities work with employers to identify workplace hazards, provide advice on compliance with OSHA standards, and assist in establishing safety and health management systems.To locate the OSHA On-site Consultation Program nearest you, call 1-800-321-6742 (OSHA) or visit http://www.osha.gov/dcsp/smallbusiness/index.html

NIOSH Prevention Through Design Program

Available online at
http://www.cdc.gov/niosh/topics/ptd

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For assistance, contact us. We can help. It's confidential.

U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

DOC FS-0000 9/2011

OSHA® FactSheet

Reducing Falls During Residential Construction: Installing Tile Roofs

When workers install tile roofs they are at risk of falling. Using personal fall arrest systems (PFAS) is the most common way to control falls during residential construction. These systems are not the only way to protect a worker and there are other options. This fact sheet describes various steps that roofing contractors can take before and during roofing jobs to keep workers from falling.

Workers Can Fall While Tiling Roofs

Roofers installing tiles risk permanent injury or death from falls. Even experienced roofers are exposed to unpredictable fall hazards caused by uneven sheathing, sudden gusts of wind, loose roofing materials, and surfaces that become slick when wet. Taking appropriate fall protection measures can reduce these risks and save lives. The employer shall provide a training program for each worker who might be exposed to fall hazards. The program shall enable each worker to recognize the hazards of falling and shall train each worker in the procedures to be followed in order to minimize these hazards. For fall protection training requirements, refer to 29 CFR 1926.503.

Tiling Roofs Safely – Important Steps

Before beginning the job, focus on identifying fall protection needs. Survey the roof to determine if there are pre-installed anchorages available that can be used. If not, then begin planning immediately to identify those systems needed to protect workers from falls and have them available before the workers report to the job.

Communicating Your Needs

The contractor that is building and sheathing the roof structure will need fall protection equipment for workers performing these jobs. At a pre-construction meeting, or at the first meeting on the work site, ask the building contractor to leave roof anchors or other fall protection equipment in place after sheathing is completed.

Using the Right Equipment

Roofers must use fall protection equipment that meets OSHA requirements whenever they work 6 feet or more above a lower level. States with OSHA-approved State Plans may have additional requirements beyond OSHA requirements. Depending on the tasks involved, where the work is taking place, and other circumstances specific to tile roofing, contractors may be able to protect

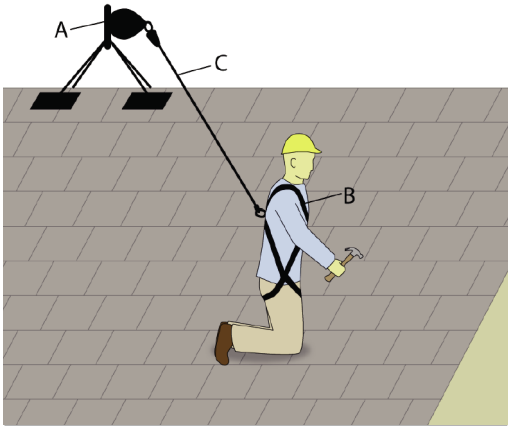
Personal Fall Arrest System (PFAS)

A PFAS is designed to safely stop a fall before the worker strikes a lower level. It includes three major components:

A. An ***anchorage*** to which the other components of the PFAS are rigged.

B. A full body ***harness*** worn by the worker.

C. A connector, such as a ***lanyard or lifeline***, linking the harness to the anchorage. A rip-stitch lanyard, or deceleration device, is typically a part of the system.



For more information on the requirements for a PFAS, refer to 29 CFR 1926.502(d).

Remember that for fall arrest systems, workers must use full-body harnesses. Body belts can cause serious injury during a fall and so OSHA prohibits their use as part of fall arrest systems.

their workers using the following equipment:

- Scaffolds
- Aerial lifts
- Personal Fall Arrest Systems (PFAS)
- Guardrails

Preparing the Work Site

Safeguarding against hazards is as important to preventing fatal falls as having good fall protection equipment. When work begins on a roof, employers must prepare the site by protecting workers from situations that could cause them to fall.

Wet or windy weather
Roofing should only be performed when weather permits. Wind and rain put workers at a greater risk for falling. In damp or windy weather, put work on hold until conditions improve.

Skylights and openings: Every year, workers die from falling through openings and weak surfaces on roofs. Employers must protect employees working around skylights and roof openings with covers, PFAS or guardrails.

Accessing the roof: Safe roof access is as important as having effective fall protection while on the roof. Employers must provide safe access and make sure that workers know how to get up and down from a roof in a way that minimizes the risk of falling. Extension ladders must extend at least three (3) feet above the roof level to ensure safe access to the roof. For other requirements on the safe use of ladders, refer to 29 CFR 1926 Subpart X – Stairways and Ladders.

Stage your materials: Preventing falls is as much about reducing the risks around workers as it is about having the right fall protection equipment. ***Be sure to put all working materials in safe spots.*** Loose tiles and hand-held equipment create tripping hazards on the roof surface. Workers can fall after tripping or slipping on something they did not see. While walking on the roof and carrying materials, the worker should keep the materials on the down-sloped edge to prevent the materials from falling into the worker if the materials are dropped.

Performing Edgework

When installing the first rows of tile near the roof edge, workers have several fall protection options. In addition to a PFAS, scaffolds and aerial lifts can provide safe access to the edge.

Scaffolds: When properly constructed and used, external scaffolds can provide suitable protection for roof repairs along the edge of the roof. Pump-jack scaffolds offer a secure platform from which to work and can be raised and lowered for specific tasks, such as working from underneath the eaves. Guardrails along the scaffold will provide fall protection. For other requirements for scaffolds, refer to 29 CFR 1926 Subpart L – Scaffolds.

Aerial lifts: A portable boom lift can allow roofers easy access to the leading edge of the roof. The adjustable angle is useful for working on roofs of all grades. It offers an easy place for workers to tie off their lifelines and to work from within the basket. Care must be taken when loading material. Do not overload the lift. For other requirements for lift, refer to 29 CFR 1926.453 – Aerial Lifts.

Anchorage

When working in an area where a scaffold or aerial lift is not practical, workers can use a PFAS with a secure anchor. OSHA requires that anchors for a PFAS are able to hold at least 5,000 pounds of weight per person, or maintain a safety factor of at least two (twice the impact load) under the supervision of a qualified person [29 CFR 1926.502(d)(15)]. Anchors must not be attached to sheathing alone, because it may not be strong enough to hold the sudden weight of a falling worker. Anchors should be fixed to a strong structural feature (like a sheathed truss). Always follow the manufacturer's instructions or consult a qualified person when installing anchors. When choosing an anchor to use for fall protection, employers have a number of options. For example:

- Peak anchor: At the top of the roof, peak anchors are typically solid, nonmoving pieces secured by the anchor to the trusses underneath.
- Permanent D-rings: Inexpensive D-ring anchors are attached to the truss frame; they are often removed after the job is done, although they can be left permanently on the roof.

Install an anchor above the area being built: Choose an anchor that is appropriate for the tile type and anchor location. Depending on the roof

design, the best location might be at the peak of the roof, directly over a truss.

Leave anchors in place: Where practical, consider leaving anchors in place. It will make the current job simpler and reduce the burden for roofers in the future. Roofing is not always the last step in the construction process. Skylight windows and solar panels might be installed later during construction. Workers installing those units will also need fall protection anchors.

Written Fall Protection Plans

If the employer does not use ladders, scaffolds, or aerial lifts, and can demonstrate that it is not feasible or would create a greater hazard to use conventional fall protection equipment (guardrails, safety nets, or PFAS) when working at heights of 6 feet or greater, the employer must develop a written site-specific fall protection plan in accord with 29 CFR 1926.502(k). The plan must be prepared by a qualified person as defined by 29 CFR 1926.32(m). This person could be the owner, the supervisor, or a worker who has extensive knowledge, training and experience with fall protection and is able to solve problems relating to fall protection. States with OSHA-approved State Plans may have additional requirements for written fall protection plans.

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U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

DOC FS-0000 9/2011

OSHA® FactSheet

Reducing Falls During Residential Construction: Roof Repair

Residential roof repair requires workers to operate on existing, largely intact roofs. These roofs are rarely designed with fall protection in mind, so roofers making repairs must plan ahead and take steps to reduce the risk of falls. This fact sheet describes several fall protection methods that contractors can incorporate into roof repair jobs so that roofers can work safely.

Risks During Roof Repair

Roofers typically work at heights that put them at risk for falls. Workers making roof repairs face the same hazards, but they can be at increased risk if the roof shows signs of lost integrity or if they are uncertain how to use fall protection on a roof that is already weatherproofed. The employer shall provide a training program for each worker who might be exposed to fall hazards. The program shall enable each worker to recognize the hazards of falling and shall train each worker in the procedures to be followed in order to minimize these hazards. For fall protection training requirements, refer to 29 CFR 1926.503. In all cases, employers must evaluate the hazards and take measures to reduce the risk of falls. For patching and repair jobs, roofers have several options, including scaffolding, aerial lifts and various types of conventional fall protection. The best choice depends on where the repair is needed and on the type of building.

How to Reduce Risk

Structural Integrity

Employers must determine the structural integrity of the roof and take all necessary precautions to protect the workers before repairs begin. If workers notice signs of structural deterioration (e.g., dry rot) as old weatherproofing is removed, a competent person should evaluate the area.

At the Roof's Edge

Access from stable platforms: When the damaged section of roof is along an edge, a roofer can work from a scaffold or aerial lift. Regardless of the condition of the roof, this equipment provides safe, stable work platforms from which the worker can reach the area to be repaired.

Lifts: Depending on the building layout and the tasks involved, lifts (e.g., scissor, aerial) may be an option for roofing work near the edge. Lifts provide stable, elevated platforms from which workers can operate safely. For small tasks, aerial lifts might be more efficient than installing scaffolds. Plus, aerial lifts are a practical way to get to a customized height above or below the roof level. Care must be taken when loading material. Do not overload the lift. For more information on the safe operation of aerial and scissor lifts, refer to 29 CFR 1926.453, Aerial Lifts and 29 CFR 1926.452(w), Mobile Scaffolds.

Scaffolds: When properly constructed and used, external scaffolds can provide suitable protection for roof repairs along the edge of the roof. Pumpjack scaffolds offer a secure platform from which to work and can be raised and lowered for specific tasks, such as working from underneath the eaves. Guardrails installed along the open side of the scaffold provide fall protection. For other requirements for scaffolds, refer to 29 CFR 1926 Subpart L-Scaffolds.

Working Higher Up on the Roof

Scaffolds: When working farther up on the roof and beyond arm's reach, scaffolds can still provide fall protection if they are properly constructed. The top rail may have to extend higher than 45 inches above the roof surface to adequately protect workers from falls. For other requirements on how to build a secure scaffold, refer to the 29 CFR 1926 Subpart L-Scaffolds.

Personal Fall Arrest System (PFAS): A PFAS is another tool available to roofers during repair jobs. In fact, a PFAS is usually the system of choice for most roofers. A breakdown in any of these parts could be disastrous for a worker.

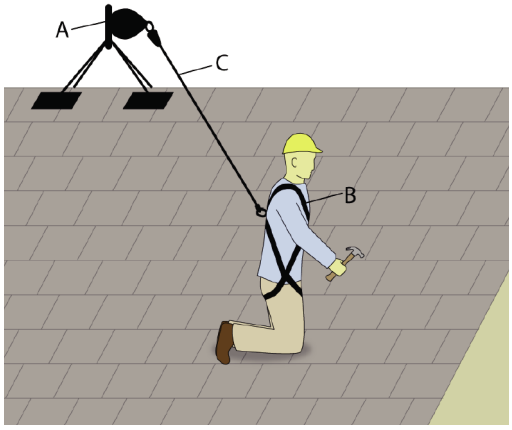
Personal Fall Arrest System (PFAS)

A PFAS is designed to safely stop a fall before the worker strikes a lower level. It includes three major components:

A. An ***anchorage*** to which the other components of the PFAS are rigged.

B. A full body ***harness*** worn by the worker.

C. A connector, such as a ***lanyard or lifeline***, linking the harness to the anchorage. A rip-stitch lanyard, or deceleration device, is typically a part of the system.



For more information on the requirements for a PFAS, refer to 29 CFR 1926.502(d).

Remember that for fall arrest systems, workers must use full-body harnesses. Body belts can cause serious injury during a fall and so OSHA prohibits their use as part of fall arrest systems.

Installing, Finding and Using Anchors

Unlike other roofing jobs, patching and repair involves otherwise intact roofs. Selecting a location to install an anchor is a critical step in avoiding a fatal fall. An anchor gives the worker a secure point to tie off the lifeline for a fall arrest system. Most of the time, existing residential roofs will not have permanent anchors available for use as fall protection. However, a qualified person should survey the roof to confirm that this is the case. An anchor for a fall arrest system must meet the 5,000-pound strength requirement or maintain a safety factor of at least two (twice the impact load) under supervision of a qualified person [1926.502(d)(15)].

Identifying existing anchors: Inspect the ridge cap and last rows of shingles for permanently installed anchors. This activity should be performed from ground level. If present, these may be fastened to the top chord or other frame part during construction. Anchors could also have been installed with the original roof, using a low-profile style sometimes painted to match the roof color (making it less obvious from the ground).

When available, existing anchors might be effective points for a worker to tie off. Before using them as tie-off points, have a qualified person inspect them to make sure they can support the weight of a falling worker. The qualified person should make sure that the anchor is solid, unbent, and well-fixed into the wood frame below. See 29 CFR 1926 Subpart M, Appendix C, for guidance about testing anchorage points.

Existing anchors are rare, but they may become more common as builders embrace practices that "design out" safety hazards.

In its *Prevention Through Design* program, the National Institute for Occupational Safety and Health (NIOSH) promotes construction practices that minimize risks to workers early in the design process.

Retrofit with anchors: If the roof was not fitted with permanent anchors, employers can install them as the first phase of the job. This retrofit process should be planned so that the roof remains intact and does not leak after the job is completed. It will likely be necessary to replace an additional shingle or reset a couple shingles or tiles. ***If attaching a new anchor, roofers must fix it to the truss or rafter structure underneath. Roof sheathing does not provide enough support by itself.***

Always follow the manufacturer's instructions, or consult a professional engineer, for proper installation. Here are some anchor options that could be used, depending on the roof design:

- Peak anchor: At the apex of the roof, peak anchors are typically solid, unmoving pieces

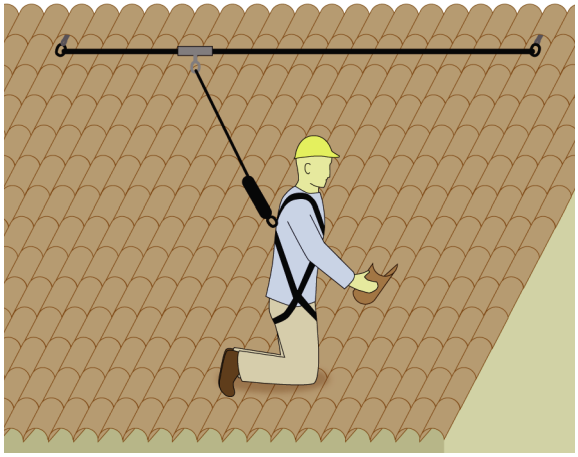
secured to the trusses underneath.

- Permanent D-rings: Inexpensive D-ring anchors attached to the truss frame that can be removed after the job is done, or left permanently on the roof.

Consider the anchor location: Depending on the roof design, some roofers choose the peak of the roof, directly over a truss. There, it will be above the worker and it will be easy to replace a small section of the ridge cap if the anchor is removed when the job is complete. Always follow the anchor manufacturer's installation instructions. See 29 CFR 1926 Subpart M, Fall Protection, for more information and additional requirements for anchor installation and use.

Add anchor points: Depending on the size of the repair job and the number of workers who need to be on the roof, it might be necessary to install more than one anchor.

An engineered horizontal lifeline is another way to increase the area in which a worker is protected. The system should be installed following the manufacturer's instructions or under the supervision of a qualified person.



Leave anchors in place: Where practical, consider leaving roof anchors in place. It will make the current job simpler and reduce the burden for roofers in the future.

Safe Roof Repair – Important Steps

- Before beginning the job, focus on identifying fall protection needs.
- Guard against falls through skylights or other roof openings. Use a guardrail system, PFAS or protective cover that will support two times the weight of a worker.
- If necessary to protect workers below from falling debris, set up a work zone while roofers remove old roofing materials from the repair area.
- Workers should be careful of air hoses and power cords for nail guns and other electrical equipment. If a worker steps on one, hoses and cords can slip underfoot and lead to falls.
- Remember to place any removed shingles or replacement tiles in a safe location. If unsecured, these materials can visually blend in against the roof and create a dangerous trip hazard.
- New materials staged on the roof should be placed so that they are safe and secure.

Written Fall Protection Plans

If the employer does not use ladders, scaffolds, or aerial lifts, and can demonstrate that it is not feasible or would create a greater hazard to use conventional fall protection equipment (guardrails, safety nets, or PFAS) when working at heights of 6 feet or greater, the employer must develop a written site-specific fall protection plan in accord with 29 CFR 1926.502(k). The plan must be prepared by a qualified person as defined by 29 CFR 1926.32(m). This person could be the owner, the supervisor, or a worker who has extensive knowledge, training and experience with fall protection and is able to solve problems relating to fall protection. States with OSHA-approved State Plans may have additional requirements for written fall protection plans.

The site-specific fall protection plan must document at each location why the use of conventional fall protection equipment is not feasible or will create a greater hazard. The plan must also describe the alternative methods that the employer will use so that workers are protected from falls. Workers and their supervisors must be trained on the proper use of those other fall protection methods.

Conventional fall protection equipment can reduce or eliminate the chances of a fatal fall. Written site-specific fall protection plans ensure that protection continues, even when conventional fall protection methods are determined to not be feasible.

OSHA standard:

29 CFR 1926 Subpart M – Fall Protection

Available online at
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10922

OSHA Residential Fall Protection Web Page
http://www.osha.gov/doc/residential_fall_protection.html

OSHA Compliance Guidance:

Compliance Guidance for Residential Construction – STD 03-11-002 (dated 12/16/2010)

Available online at
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=4755

State Plan Guidance: States with OSHA-approved State Plans may have additional requirements for Residential Roofing within State Plans. For more information on these requirements, please visit: http://www.osha.gov/dcsp/osp/statestandards.html.

Help for Employers: OSHA's On-site Consultation Program offers free and confidential advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites. On-site Consultation services are separate from enforcement and do not result in penalties or citations. Consultants from state agencies or universities work with employers to identify workplace hazards, provide advice on compliance with OSHA standards, and assist in establishing safety and health management systems.To locate the OSHA On-site Consultation Program nearest you, call 1-800-321-6742 (OSHA) or visit http://www.osha.gov/dcsp/smallbusiness/index.html

NIOSH Prevention Through Design Program

Available online at
http://www.cdc.gov/niosh/topics/ptd

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For assistance, contact us. We can help. It's confidential.

U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

DOC FS-0000 9/2011

OSHA FactSheet

Working Safely with Electricity

Working with electricity can be dangerous. Engineers, linemen, electricians, and others work with electricity directly, including overhead lines, cable harnesses, and circuit assemblies. Office workers and salespeople work with electricity indirectly and may also be exposed to electrical hazards.

Generators

One of the common tools utilized following the loss of power are portable generators. Most generators are gasoline powered and use internal combustion engines to produce electricity. Carbon monoxide is a colorless and odorless gas produced during the operation of gasoline powered generators. When inhaled, the gas reduces your ability to utilize oxygen. Symptoms of carbon monoxide poisoning include headache, nausea and tiredness that can lead to unconsciousness and ultimately prove fatal.

- DO NOT bring a generator indoors. Be sure it is located outdoors in a location where the exhaust gases cannot enter a home or building. Good ventilation is the key.
- Be sure that the main circuit breaker is OFF and locked out prior to starting any generator. This will prevent inadvertent energization of power lines from back feed electrical energy from generators and help protect utility line workers from possible electrocution.
- Turn off generators and let them cool prior to refueling.

Power Lines

Overhead and buried power lines are especially hazardous because they carry extremely high voltage. Fatal electrocution is the main risk, but burns and falls are also hazards.

- Look for overhead power lines and buried power line indicators.
- Stay at least 10 feet away from overhead power lines and assume they are energized.
- De-energize and ground lines when working near them.
- Use non-conductive wood or fiberglass ladders when working near power lines.

Extension Cords

Normal wear on cords can loosen or expose wires. Cords that are not 3-wire type, not designed for hard-usage, or that have been modified, increase your risk of contacting electrical current.

- Use only equipment that is approved to meet OSHA standards.
- Do not modify cords or use them incorrectly.
- Use factory-assembled cord sets and only extension cords that are 3-wire type.
- Use only cords, connection devices, and fittings that are equipped with strain relief.
- Remove cords from receptacles by pulling on the plugs, not the cords.

Equipment

Due to the dynamic, rugged nature of construction work, normal use of electrical equipment causes wear and tear that results in insulation breaks, short-circuits, and exposed wires. If there is no ground-fault protection, it can cause a ground-fault that sends current through the worker's body.

- Use ground-fault circuit interrupters (GFCIs) on all 120-volt, single-phase, 15- and 20-ampere receptacles, or have an assured equipment grounding conductor program (AEGCP).
- Use double-insulated tools and equipment, distinctively marked.
- Visually inspect all electrical equipment before use. Remove from service any equipment with frayed cords, missing ground prongs, cracked tool casings, etc.

Electrical Incidents

If the power supply to the electrical equipment is not grounded or the path has been broken, fault

current may travel through a worker's body, causing electrical burns or death. Even when the power system is properly grounded, electrical equipment can instantly change from safe to hazardous because of extreme conditions and rough treatment.

- Visually inspect electrical equipment before use. Take any defective equipment out of service.
- Ground all power supply systems, electrical circuits, and electrical equipment.
- Frequently inspect electrical systems to insure that the path to ground is continuous.
- Do not remove ground prongs from cord- and plug-connected equipment or extension cords.
- Use double-insulated tools and ground all exposed metal parts of equipment.
- Avoid standing in wet areas when using portable electrical power tools.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

Think Safety!

For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

OSHA FactSheet

Working Safely Around Downed Electrical Wires

Electrical hazards exist in some form in nearly all occupations. However, those hazards multiply for workers involved in cleanup and recovery efforts following major disasters and weather emergencies. One particular life-threatening danger exists around downed and low-hanging electrical wires.

Safety First

Above all else, always consider all equipment, lines and conductors to be energized. Be cautious and if you notice downed wires or damaged electrical equipment, contact appropriate utility personnel. Remember that circuits do not always turn off when a power line falls into a tree or onto the ground. Even if they are not sparking or humming, fallen power lines can kill you if you touch them or even the ground nearby.

Energy

Downed wires can energize other objects, including fences, water pipes, bushes and trees, buildings, telephone/CATV/fiber optic cables and other electric utilities. Even manhole castings and reinforcement bars (re/bar) in pavement can become energized by downed wires. During storms, wind-blown objects such as canopies, aluminum roofs, siding, sheds, etc., can also be energized by downed wires.

Backfeed

When electrical conductors are inadvertently energized by other energy sources, backfeed occurs. Some of those sources include:

- Circuit ties/switch points
- Lightning
- Generators
- Downstream events

Simply testing for energy sources is not sufficient since hazardous electrical events can happen without warning. Ensure that proper lockout/tagout procedures are always followed.

Rules to live by

- Do NOT assume that a downed conductor is safe simply because it is on the ground or it is not sparking.
- Do NOT assume that all coated, weather-proof or insulated wire is just telephone, television or fiber-optic cable.
- Low-hanging wires still have voltage potential even if they are not touching the ground. So, “don’t touch them.” Everything is energized until tested to be de-energized.
- Never go near a downed or fallen electric power line. Always assume that it is energized. Touching it could be fatal.
- Electricity can spread outward through the ground in a circular shape from the point of contact. As you move away from the center, large differences in voltages can be created.
- Never drive over downed power lines. Assume that they are energized. And, even if they are not, downed lines can become entangled in your equipment or vehicle.
- If contact is made with an energized power line while you are in a vehicle, remain calm and do not get out unless the vehicle is on fire. If possible, call for help.
- If you must exit any equipment because of fire or other safety reasons, try to jump completely clear, making sure that you do not touch the equipment and the ground at the same time. Land with both feet together and shuffle away in small steps to minimize the path of electric current and avoid electrical shock. Be careful to maintain your balance.

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For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

DOC 7/2005

OSHA FactSheet

Electrical Safety Hazards of Overloading Cable Trays

According to the 2005 National Electrical Code® (NEC), a cable tray system is "[a] unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways." Cable trays support cable across open spans in the same manner that roadway bridges support traffic. Cable trays are not raceways, and are treated as a structural component of a facility's electrical system. Cable trays are a part of a planned cable management system to support, route, protect and provide a pathway for cable systems.

Cable trays feature flexibility unmatched by conduit, as cables are easier to mark, remove and find in cable trays. Cable trays are available in a number of different configurations, including ladder, ventilated trough, ventilated channel, solid bottom, wire mesh, single rail, and other similar structures. They are manufactured in steel, aluminum, and fiber reinforced plastic (FRP), although aluminum accounts for about 70% of the cable trays used in industry today.

Overloading cable trays

Cable trays come in a wide variety of sizes. The appropriate size and number of cable trays depends directly on the number and size of conductors intended and the allowable fill area as specified in the NEC. Also, since cable trays offer flexibility for modification and expansion, engineers and designers should plan cable tray systems to be sized and designed to anticipate both current and future needs.

Cable tray fill is addressed in the 2005 edition of NEC Sections 392.8, 392.9, 392.10, and 392.12. The type of cable tray (e.g., solid, ventilated), ampacity requirements, and the type and voltage rating of cable used determines the allowable fill for each cable tray — ventilated cable trays provide for the greatest allowable fill due to increased airflow. A generic guideline provided by The Cable Tray Institute indicates that cable trays should not be filled in excess of 40-50% of the inside area of the tray or of the maximum weight based on the cable tray specifications. The NEC provides specific and more detailed requirements for cable tray fill. In any case, the best strategy is to review and follow the rules set out in the NEC and the manufacturer's installation guides when installing cables in cable trays.

Hazards associated with overloaded cable trays

Overfilling and improperly securing wires in cable trays can lead to a number of serious hazards. Weight is one issue; all cable trays and their associated supports are rated for a specific maximum weight, based partly on the allowable fill area and the spacing of the cable tray supports. Overloading cable trays can lead to a breakdown of the tray, its connecting points, and/or supports, causing hazards to persons underneath the cable tray and even leading to possible electric shock and arc-flash/blast events from component failure when the cables are suddenly no longer supported. Additionally, cables in trays can be damaged by improperly securing and installing other cables and wires in the same cable tray.

The NEC requirements for cable tray fill also consider the heat buildup in conductors while current flows. When cable trays are overloaded, excessive heat buildup in and around live conductors can cause the insulation to break down, leading to potential shock hazards or fires. Fires can occur either in the cable tray (which may provide a fire path) or in combustible materials near the cable tray. Furthermore, the improper use of flexible cord could lead to the spread of toxic fumes if a fire were to occur.

Grounding of cable tray systems is essential for personal safety and protection against arc-

ing that can occur anywhere in the wiring system. Proper grounding must be done before cables are installed and tested before cables are energized. In addition to these general requirements, metallic cable tray systems supporting electrical conductors must be electrically continuous and effectively bonded as per the requirements of the 2005 edition of NEC Section 392.7.

Recognizing overloaded cable trays

Recognizing overloaded cable trays is not difficult. The fill values for cable trays specified in the 2005 NEC range from a single layer to roughly a 50% fill of the cross-sectional area of the cable tray. If visual observation reveals a cable tray that is completely full and/or overflowing with cables, chances are that the cable tray is in violation of both the National Electrical Code and OSHA requirements. One of the major culprits associated with overloaded cable trays are abandoned cables within the tray. These abandoned cables should be removed; and in fact, section 590.3(D) and various sections in Chapter 8 of the 2005 NEC specifically require removal of abandoned temporary wiring and communication cable installed within a cable tray.

Wiring methods permitted in cable trays

Any wiring methods used in cable trays must be listed by a Nationally Recognized Testing Laboratory as suitable for use in cable trays and in the environment in which it is installed. Table 392.3(A) of the NEC and OSHA's 1910.305(a)(3)(i) provide corresponding lists of conductors and raceways permitted in cable tray systems. Additionally, NEC Section 392.3(B) and OSHA's 1910.305(a)(3)(i)(B) allow other specific conductors in industrial establishments where maintenance and supervision assure that only qualified persons will service the cable tray systems. Flexible cords are not currently listed for use in cable trays (NEC Article 400, OSHA, 1910.305(g)) as they are prohibited as a replacement for the fixed wiring of a structure. The insulation on flexible cords can break down and become brittle over the years, which can lead to shorts and fires containing toxic fumes.

Standards and regulations that apply to cable trays

Cable trays were first covered in the 1965 edition of the NEC, under Continuous Rigid Cable Supports. Today, the use and installation of cable trays is covered by Article 392 of the NEC, and by OSHA regulations in 29 CFR 1910.305(a)(3) and 1910.399, or comparable standards promulgated by States operating OSHA-approved State plans. Specific permitted uses of cable trays are covered by the 2005 edition of NEC Section 392.3 and OSHA's 1910.305(a)(3)(i); uses not permitted are addressed in NEC 392.4 and OSHA's 1910.305(a)(3)(ii). Other sections and articles of the NEC are referenced throughout Article 392 for specific installation and use issues. The National Electrical Manufacturers Association (NEMA) also publishes three standards that apply to the proper manufacture and installation of cable trays: ANSI/NEMA-VE 1-1998, Metal Cable Tray Systems; NEMA-VE 2-1996, Metal Cable Tray Installation Guidelines; and NEMA-FG-1998, Nonmetallic Cable Tray Systems.

For more information

National Electrical Code®, (2005 Edition) Article 392 (See also NEC Handbook).

OSHA 29 CFR 1910.305(a)(3) and 1910.399.

Cable Tray Institute (http://www.cabletrays.com).

The Cable Tray Manufacturer's Installation and Use Instructions.

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For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov

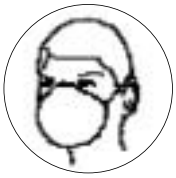
(800) 321-OSHA

DSTM 03/2006

OSHA QUICK CARD™

Protect Yourself
Respirators

Respiratory protection must be worn whenever you are working in a hazardous atmosphere. The appropriate respirator will depend on the contaminant(s) to which you are exposed and the protection factor (PF) required. Required respirators must be NIOSH-approved and medical evaluation and training must be provided before use.

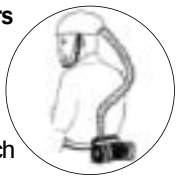


Single-strap dust masks are usually not NIOSH-approved. They must not be used to protect from hazardous atmospheres. However, they may be useful in providing comfort from pollen or other allergens.

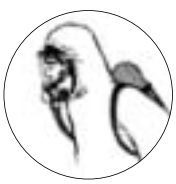
Approved filtering facepieces (dust masks) can be used for dust, mists, welding fumes, etc. They do not provide protection from gases or vapors. DO NOT USE FOR ASBESTOS OR LEAD; instead, select from the respirators below.

Half-face respirators can be used for protection against most vapors, acid gases, dust or welding fumes. Cartridges/filters must match contaminant(s) and be changed periodically.

Full-face respirators are more protective than half-face respirators. They can also be used for protection against most vapors, acid gases, dust or welding fumes. The face-shield protects face and eyes from irritants and contaminants. Cartridges/filters must match contaminant(s) and be changed periodically.



Loose-fitting powered-air-purifying respirators (PAPR) offer breathing comfort from a battery-powered fan which pulls air through filters and circulates air throughout helmet/hood. They can be worn by most workers who have beards. Cartridges/filters must match contaminant(s) and be changed periodically.



A Self-Contained Breathing Apparatus (SCBA) is used for entry and escape from atmospheres that are considered immediately dangerous to life and health (IDLH) or oxygen deficient. They use their own air tank.

For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA

OSHA 3280-10N-05

OSHA® FactSheet

Respiratory Infection Control: Respirators Versus Surgical Masks

It is important that employers and workers understand the significant differences between these two types of personal protective equipment. The decision whether or not to require workers to use either surgical masks or respirators must be based upon a hazard analysis of the workers' specific work environments and the different protective properties of each type of personal protective equipment.

The use of surgical masks or respirators is one practice that may reduce the risk of infectious disease transmission between infected and noninfected persons. Since there is limited historical information on the effectiveness of surgical masks and respirators for the control of influenza during any previous pandemics, the effectiveness of surgical masks and respirators has been inferred on the basis of the mode of influenza transmission, particle size and professional judgment.

To offer protection, both surgical masks and respirators need to be worn correctly and consistently. If used properly, surgical masks and respirators both have a role in preventing different types of exposures. During an influenza pandemic, surgical masks and respirators need to be used in conjunction with interventions that are known to prevent the spread of infection, such as engineering and administrative controls (e.g., installing sneeze guards, teleworking) and work practices (e.g., cough etiquette, hand hygiene, and avoiding large gatherings).

Respirators

Respirators are designed to reduce a worker's exposure to airborne contaminants. Respirators come in various sizes and must be individually selected to fit the wearer's face and to provide a tight seal. A proper seal between the user's face and the respirator forces inhaled air to be pulled through the respirator's filter material and not through gaps between the face and respirator.

Respirators offer the best protection for workers who must work closely (either in contact with or within 6 feet) with people

who have influenza-like symptoms. These generally include those workers who work in occupations classified as *very high exposure risk* or *high exposure risk* to pandemic influenza. For additional information on very high and high exposure risk occupations, please refer to OSHA Publication No. 3327, entitled *Guidance on Preparing Workplaces for an Influenza Pandemic*, which can be found at http://www.osha.gov/dsg/topics/pandemicflu/index.html.

Where workers are required by employers to wear respirators, they must be NIOSH-certified, selected, and used in the context of a comprehensive respiratory protection program, (see OSHA standard 29 CFR 1910.134, or www.osha.gov/SLTC/respiratoryprotection/index.html). It is important to medically evaluate workers to ensure that they can perform work tasks while wearing a respirator. For many workers, medical evaluation may be accomplished by having a physician or other licensed healthcare provider review a

respiratory questionnaire completed by the worker (found in Appendix C of OSHA's Respiratory Protection standard, 29 CFR 1910.134) to determine if the worker can be medically cleared to use a respirator. Employers who have never before needed to consider a respiratory protection plan should note that it can take time to choose an appropriate respirator to provide to workers; arrange for a qualified trainer; and provide training, fit testing and medical evaluation for their workers. If employers wait until an influenza pandemic occurs, they may be unable to implement an adequate respiratory protection program in a timely manner.

Surgical Masks

Surgical masks are used as a physical barrier to protect the user from hazards, such as splashes of large droplets of blood or body fluids.

Surgical masks also protect other people against infection from the person wearing the surgical mask. Such masks trap large particles of body fluids that may contain bacteria or viruses expelled by the wearer.

Surgical masks are used for several different purposes, including the following:

- Placed on sick people to limit the spread of infectious respiratory secretions to others.
- Worn by healthcare providers to prevent accidental contamination of patients' wounds by the organisms normally present in mucus and saliva.
- Worn by workers to protect themselves from splashes or sprays of blood or bodily fluids; they may also keep contaminated fingers/hands away from the mouth and nose.

Surgical masks are not designed or certified to prevent the inhalation of small airborne contaminants. These particles are not visible to the naked eye but may still be capable of causing infection. Surgical masks are not designed to seal tightly against the user's face. During inhalation, much of the potentially contaminated air can pass through gaps between the face and the surgical mask and not be pulled through the filter material of the mask. Their ability to filter small particles varies significantly based upon the type of material used to make the surgical mask, so they cannot be relied upon to protect workers against airborne infectious agents. Only surgical masks that are cleared by the U.S. Food and Drug Administration to be legally marketed in the United States have been tested for their ability to resist blood and body fluids.

For more complete information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

DSG 5/2009

OSHA® QUICK CARD™

Pneumatic Nail Gun

Safety

Nail guns drive nails and staples into building materials. Injuries or fatalities can result from improper use.

Hazards

The operator and coworkers are at risk. Eyes, hands and fingers are especially at risk. Nails can:

- Splinter or blow out fragments from the material.
- Puncture the back of the material.
- Fire completely through the material and strike workers behind the nailing surface.
- Pose contact hazards, such as nails striking electrical wires.

Common Tool Types

Sequential tools: Require nose (workpiece contact) to be depressed before the trigger is pulled.

- Two-step sequence makes accidental firing less likely.
- Can be used for most nailing tasks.

Contact tools: Tool fires anytime the trigger and nose (workpiece contact) are both depressed.

- Trigger can be held down to allow "bump firing".
- Use for nailing on flat surfaces.
  CAUTION:
  - If trigger is depressed, the tool will fire anytime the nose is depressed; can also cause unwanted double firing of nails.

Safe Work Practices and PPE

- Follow manufacturer's tool labels and operating manual.
- Wear safety glasses with side shields.
- Never defeat or modify safety features.
- Keep fingers away from trigger when not driving nails.
- Sequential tools have reduced risk of accidental and double firing.
- Avoid line of fire hazards in front of and behind material; position yourself (especially your free hand) out of the line of fire. Never point nail gun at anyone. Watch for coworkers behind the nailing surface.
- Disconnect the gun to perform maintenance, move to another work area, or clear jams.
- Train on safe operating procedures, proper body placement and correct PPE use.
- NOTE: The tool must meet applicable OSHA guarding standards.

OSHA® Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov (800) 321-OSHA

OSHA 3363-4-09

OSHA® QUICK CARD™

Chain Saw Safety

Operating a chain saw can be hazardous. Potential injuries can be minimized by using proper personal protective equipment and safe operating procedures.

Before Starting a Chain Saw

- Check controls, chain tension, and all bolts and handles to ensure that they are functioning properly and that they are adjusted according to the manufacturer's instructions.
- Make sure that the chain is always sharp and that the oil tank is full.
- Start the saw on the ground or on another firm support. Drop starting is never allowed.
- Start the saw at least 10 feet from the fueling area, with the chain's brake engaged.

Fueling a Chain Saw

- Use approved containers for transporting fuel to the saw.
- Dispense fuel at least 10 feet away from any sources of ignition when performing construction activities. **No smoking during fueling.**
- Use a funnel or a flexible hose when pouring fuel into the saw.
- Never attempt to fuel a running or HOT saw.

Chain Saw Safety

- Clear away dirt, debris, small tree limbs and rocks from the saw's chain path. Look for nails, spikes or other metal in the tree before cutting.
- Shut off the saw or engage its chain brake when carrying the saw on rough or uneven terrain.
- Keep your hands on the saw's handles, and maintain balance while operating the saw.
- Proper personal protective equipment must be worn when operating the saw, which includes hand, foot, leg, eye, face, hearing and head protection.
- Do not wear loose-fitting clothing.
- Be careful that the trunk or tree limbs will not bind against the saw.
- Watch for branches under tension; they may spring out when cut.
- Gasoline-powered chain saws must be equipped with a protective device that minimizes chain saw kickback.
- Be cautious of saw kickback. To avoid kickback, do not saw with the tip. Keep tip guard in place.

For more complete information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor

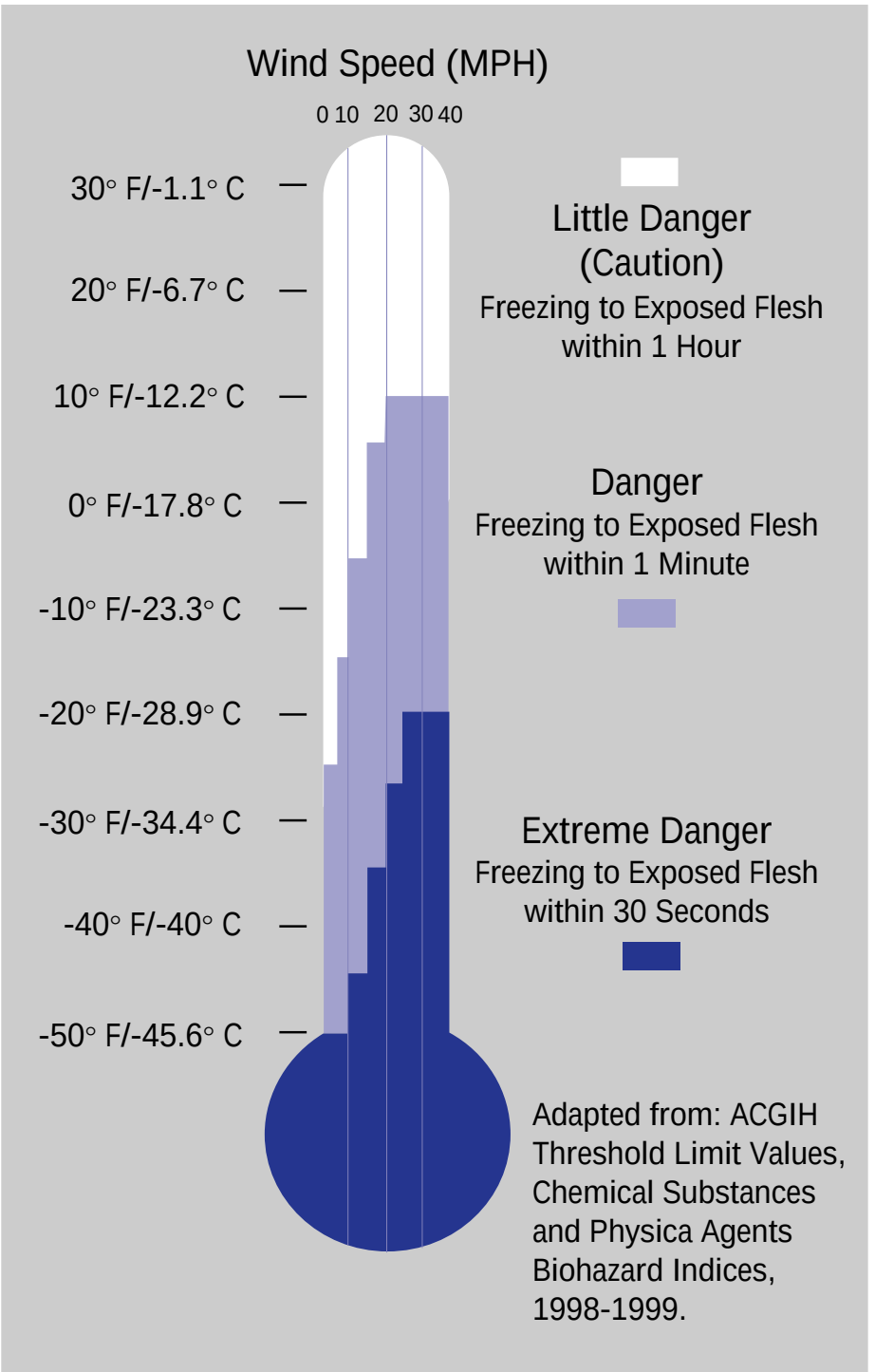
www.osha.gov (800) 321-OSHA

OSHA 3269-12N-05

THE COLD STRESS EQUATION

LOW TEMPERATURE + WIND SPEED + WETNESS = INJURIES & ILLNESS

When the body is unable to warm itself, serious cold-related illnesses and injuries may occur, and permanent tissue damage and death may result. **Hypothermia** can occur when *land temperatures* are **above** freezing or *water temperatures* are below 98.6°F/ 37°C. Cold-related illnesses can slowly overcome a person who has been chilled by low temperatures, brisk winds, or wet clothing.



U.S. Department of Labor
Occupational Safety and Health Administration
OSHA 3156
1998

FROST BITE

What Happens to the Body:

FREEZING IN DEEP LAYERS OF SKIN AND TISSUE; PALE, WAXY-WHITE SKIN COLOR; SKIN BECOMES HARD and NUMB; USUALLY AFFECTS THE FINGERS, HANDS, TOES, FEET, EARS, and NOSE.

What Should Be Done: (land temperatures)

- Move the person to a warm dry area. Don't leave the person alone.
- Remove any wet or tight clothing that may cut off blood flow to the affected area.
- **DO NOT** rub the affected area, because rubbing causes damage to the skin and tissue.
- **Gently** place the affected area in a warm (105°F) water bath and monitor the water temperature to **slowly** warm the tissue. Don't pour warm water directly on the affected area because it will warm the tissue too fast causing tissue damage. Warming takes about 25-40 minutes.
- After the affected area has been warmed, it may become puffy and blister. The affected area may have a burning feeling or numbness. When normal feeling, movement, and skin color have returned, the affected area should be dried and wrapped to keep it warm. **NOTE:** If there is a chance the affected area may get cold again, do not warm the skin. If the skin is warmed and then becomes cold again, it will cause severe tissue damage.
- Seek medical attention as soon as possible.

HYPOTHERMIA - (Medical Emergency)

What Happens to the Body:

NORMAL BODY TEMPERATURE (98.6° F/37°C) DROPS TO OR BELOW 95°F (35^0 C); FATIGUE OR DROWSINESS; UNCONTROLLED SHIVERING; COOL BLUISH SKIN; SLURRED SPEECH; CLUMSY MOVEMENTS; IRRITABLE, IRRATIONAL OR CONFUSED BEHAVIOR.

What Should Be Done: (land temperatures)

- Call for emergency help (i.e., Ambulance or Call 911).
- Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace with warm, dry clothing or wrap the person in blankets.
- Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. **Avoid drinks with caffeine** (coffee, tea, or hot chocolate) or alcohol.
- Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. **DO NOT** rub the person's body or place them in warm water bath. This may stop their heart.

What Should Be Done: (water temperatures)

- Call for emergency help (Ambulance or Call 911). Body heat is lost up to 25 times faster in water.
- **DO NOT** remove any clothing. Button, buckle, zip, and tighten any collars, cuffs, shoes, and hoods because the layer of trapped water closest to the body provides a layer of insulation that slows the loss of heat. Keep the head out of the water and put on a hat or hood.
- Get out of the water as quickly as possible or climb on anything floating. **DO NOT** attempt to swim unless a floating object or another person can be reached because swimming or other physical activity uses the body's heat and reduces survival time by about 50 percent.
- If getting out of the water is not possible, wait quietly and conserve body heat by folding arms across the chest, keeping thighs together, bending knees, and crossing ankles. If another person is in the water, huddle together with chests held closely.

How to Protect Workers

- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries.
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker.
- Train the workforce about cold-induced illnesses and injuries.
- Select proper clothing for cold, wet, and windy conditions. Layer clothing to adjust to changing environmental temperatures. Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene).
- Take frequent short breaks in warm dry shelters to allow the body to warm up.
- Perform work during the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system (work in pairs).
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.
- Eat warm, high-calorie foods like hot pasta dishes.

Workers Are at Increased Risk When…

- They have predisposing health conditions such as cardiovascular disease, diabetes, and hypertension.
- They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you while working in cold environments).
- They are in poor physical condition, have a poor diet, or are older.