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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

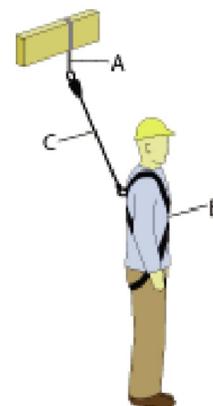
Accidental falls are the leading cause of death for construction workers and installing roof trusses can be particularly dangerous for two reasons: (1) truss construction usually occurs high above the ground and (2) trusses are not stable until they are properly restrained and braced. Roof trusses are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

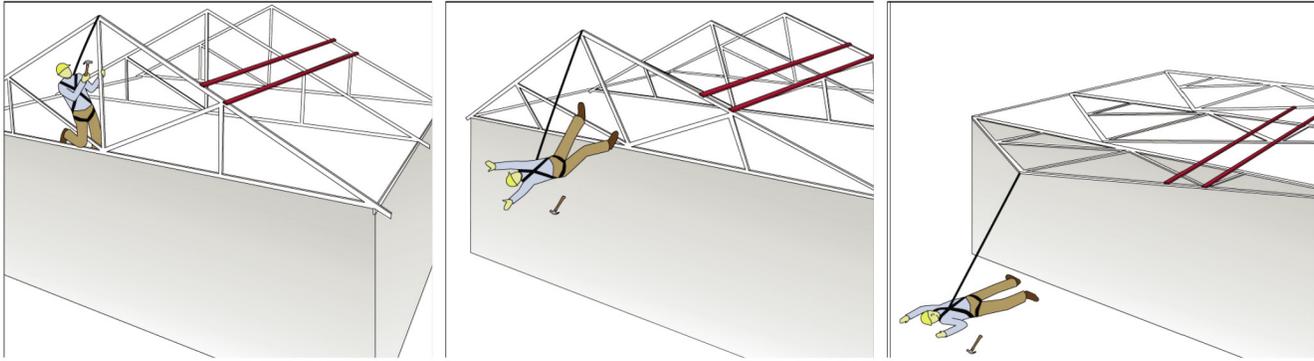
- A. An anchorage to which the other components of the PFAS are rigged.
- B. A full body harness worn by the worker.
- C. A connector, such as a lanyard or lifeline, linking the harness to the anchorage. A rip-stitch lanyard, or deceleration device, is typically a part of the system.



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 accordance 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.

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.

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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