PREVENTING FALLS IN CONSTRUCTION

Falls were the leading cause of worksite fatalities in the construction industry in 2014

Falls are consistently the leading cause of death in construction. In Kentucky, between the years 2009 and 2014, 23 fatal falls occurred in construction. In 2014, 349 out of the 874 deaths in construction in the U.S. were due to falls, the Bureau of Labor Statistics reports. Furthermore, 24.5% of nonfatal injuries resulting in days spent away from work in construction were due to fall related incidents. Nonfatal falls are often debilitating and result in long-term pain, disability, worktime loss, and decreased quality of life.

As shown by the above statistics, falls are a very real and serious safety threat in the construction industry that should never be taken lightly. To protect yourself from injury or death on the job, educate yourself about workplace dangers and practical ways in which you can work safely. The Occupational Safety and Health Administration (OSHA) has identified the following four hazards as the most common causes of fall-related injuries and death in the construction industry:

1. **Unprotected Edges, Wall Openings, and Floor Holes**
2. **Improper Scaffold Construction**
3. **Unguarded Protruding Steel Rebars**
4. **Misuse of Portable Ladders**

This workbook will address these fall-related hazards in detail and provide practical knowledge that, when applied, can help to ensure you make it home when the workday is finished.

Contained in this packet:

- **Information regarding the top 4 causes of fall injuries in the construction industry**
- **Tips, guidelines, and regulations for preventing the top 4 causes of falls**
- **Real-life case stories**
- **Self-quizzes**
- **Links to other resources**

Unprotected Edges, Wall Openings, and Floor Holes

Falls to lower levels are a major cause of death in the construction industry. Most construction sites at some point have unprotected sides, wall openings, or floor holes during the various phases of projects. It is crucial to have safety mechanisms in place to protect yourself and other workers from falling into these openings. Injuries related to falls from height often range from sprains, to concussions, or even death.

Carrying materials that impede your view can also increase the risk of a fall. Many injuries occur when work areas are unorganized and have scattered materials, increasing the odds of trips and falls.

How can I avoid these Hazards?

⚠ **29 CFR 1926.501** requires that you use at least one of the following whenever exposed to a fall hazard of 6 feet or more above a lower level: A) Guardrail Systems, B) Safety Net Systems, and/or C) Fall Arrest Systems.

DO:

- ✓ If you make a hole, cover or guard it immediately. If possible, before cutting the hole, barricade the work area to keep people out.
- ✓ Ensure that hole covers can effectively support two times the weight of employees, equipment, and materials that may be imposed on the cover. Refrain from using non-substantial materials like paper, plastic, and cardboard. Label the hole "**Caution: Floor Opening.**"
- ✓ Guard skylights as they cannot support the weight of workers or equipment.
- ✓ Inspect fall arrest systems before each use for cuts, nicks, and frays.

DO NOT:

- ⊘ Set up fall arrest systems in high wind conditions.
- ⊘ Use fall arrest or safety net systems that appear to be damaged or deficient.

Unprotected Edges, Wall Openings, and Floor Holes (cont'd)

Real Life Kentucky Case Reports

Case 1: Two roofers arrived on a job, climbed a ladder to the roof, and began strategizing where to tie off their fall arrest systems. While reviewing the backside of the structure, a 33 m.p.h. gust of wind caused the two roofers to lose their balance and fall from the roof. One roofer fell to the ground, followed by the other roofer falling on top of him. The roofer who fell first died of injuries sustained both by his own fall and the crushing impact of the second worker.

Case 2: A laborer was tasked with cleaning debris from a steep commercial building roof. Along with two other workers, he made his way to the rooftop. The victim did not wear his fall arrest system despite the availability of sufficient fall protection. He grabbed a bag for trash and began walking toward the edge of the roof, when he slipped and fell 60 feet to the sidewalk below. He died at the scene of multiple blunt force injuries.

Case 3: A 34-year-old worker in a commercial building project stepped into an unguarded elevator shaft and fell 13 feet and 8 inches to his death. Two other employees were looking for empty buckets and found the victim at the bottom of the elevator shaft. It was unclear how long he had been there. Emergency Medical Services were notified and arrived on the scene, pronouncing the victim dead. His death was due to blunt force trauma injuries sustained in the fall.

Case 4: A roofer was removing shingles from a 9/12 pitched singled church rooftop. As he leaned back on the leading edge of the roof, his safety rope snapped, causing him to fall 29 feet to the ground below. The investigation discovered that the worker was not properly tied off, and the rope was not qualified for fall arrest system use. The nylon rope showed considerable signs of wear upon inspection during the proceeding investigation.

How might each of the above deaths been prevented?

Case 1: _____

Case 2: _____

Case 3: _____

Case 4: _____

Improper Scaffolding Construction

Working with heavy equipment and building materials on the limited space of a scaffold is challenging. Without proper fall protection, safe access, and stability, it becomes a hazardous situation. Falls from improperly constructed scaffolding can lead to serious injury or even death.

In a recent BLS study, 72 percent of workers attributed scaffolding injuries to the planking or support giving way, to the lack of guardrails and/or fall protection, and to objects falling from overhead. Scaffolding incidents account for about 4,500 injuries and 50 deaths every year in the U.S.

How can I avoid these Hazards?

⚠ **29 CFR 1926.451(g)(1)** requires that any employee on a scaffolding more than **10 feet** above a lower level be protected from falling to that lower level.

DO

- ✓ Construct all scaffolds according to manufacturer's specifications.
- ✓ Install guardrail systems along all open sides and ends of elevated platforms.
- ✓ Ensure scaffolding is braced or tied to the building at all times.
- ✓ Use metal catwalks when possible. If using wood, it must be scaffold grade or better.
- ✓ Ensure safe access to and from the platform before use.
- ✓ Know and abide by the load capacity. Do not allow more workers or equipment than the scaffold can handle.
- ✓ Always wear hardhats and other PPE to protect from falling objects.

DO NOT

- ⊘ Mix different scaffolding types together in the same scaffold.
- ⊘ Climb cross-bracing or guardrails to access the scaffolding platforms.
- ⊘ Jump from, to, or between scaffolding.
- ⊘ Clutter the platform walkway with materials in a way that would impede safe movement.

Improper Scaffolding Construction (cont'd)

Can you identify the safety hazards in the following photos?

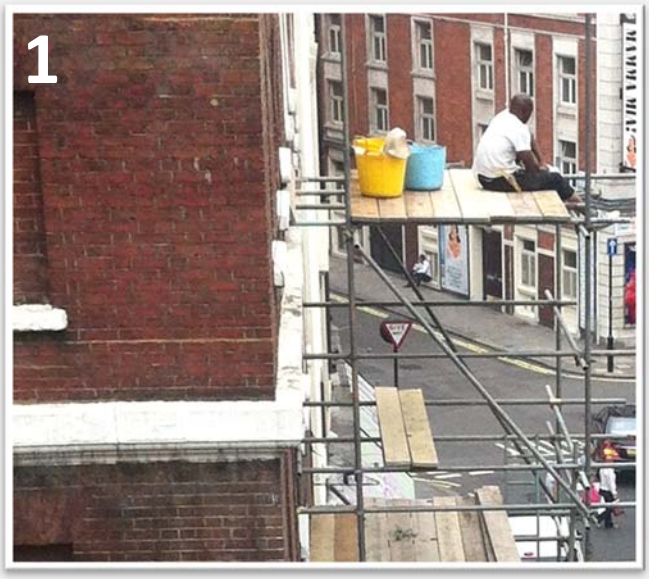

Photo 1:

A. _____

_____

B. _____

_____

C. _____

_____

Photo 2:

A. _____

_____

B. _____

_____

C. _____

_____

D. _____

_____

Unguarded Protruding Steel Rebars

Unguarded protruding steel rebars are a serious threat to safety on the jobsite. Even a small trip or slip can cause impalement. Unguarded steel rebars become an even greater threat when workers are elevated above them without proper fall protection. When working with rebar at grade level, the risk of impalement depends on a number of factors, including: proximity of rebar to worker; height of the rebar; etc. For example, working at grade around rebar that is 3-6 feet high would be unlikely to cause an impalement. Protective rebar caps should be used to prevent cuts, abrasions, or other minor injuries.

Remember, when working at a construction site you must take full responsibility for your own personal safety. If you see uncovered rebar, do not proceed with the job until it has been correctly guarded.

How can I avoid these Hazards?

DO:

- ✓ Ensure a competent person assesses the site for rebar-related hazards prior to beginning work.
- ✓ Cap all protruding ends of steel rebar with steel-reinforced rebar caps or wooden troughs.
- ✓ If caps are unavailable, bend rebar so exposed ends are no longer upright.
- ✓ When employees are working at any height above exposed rebar, fall protection must be used as the first defense against impalement.

DO NOT:

- ⊘ Work around unprotected rebar, especially from heights.
- ⊘ Use rebar caps made of plastic.

Unguarded Protruding Steel Rebars (cont'd)

Not all rebar guards are created equal

Mushroom-style plastic caps

CFR 1926.701(b) requires that rebar be "guarded to eliminate the hazard of impalement." **Not all guards provide this level of protection.** In some instances, the force of a person falling onto a guarded rebar can cause the steel bar to push through a cap made of plastic (pictured left) and still cause impaling injuries. In many cases, the worker can even be impaled by the rebar with the cap still intact.

What type of rebar guards should I use?

Considering the serious nature of the above hazard, the standard mushroom-style plastic rebar caps should not be relied upon for protection from impalement. Only rebar caps designed to protect against impalement should be used, such as steel – reinforced square caps (pictured upper right) or wooden troughs (pictured lower right).

As a general rule of thumb, consider rebar protective devices capable of withstanding at least 250 pounds being dropped from a height of 10 feet adequate enough protection to meet the requirements found in 1926.701(b).

Steel-reinforced cap

Wooden trough cap

OSHA Case Report: A laborer was working from a rooftop when he fell through a roof opening approximately 8 feet onto a patio which had about 20 half-inch rebars pointing upward. The laborer was impaled by one of the bars and died as a result of his injuries.

Identify three hazards in this scenario that may have contributed to this worker's death.

_____

_____

_____

_____

Misuse of Portable 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 even from a height of only a few feet can be fatal. Slow down and take an extra moment to ensure you are using the ladder safely.

Factors that contribute to falls from ladders include:

- Working in a hurry
- Ladder placement
- Sudden movement
- Lack of attention
- Condition of the ladder
- User age or physical condition

How can I avoid these Hazards?

DO:

- ✓ Use the correct ladder for the job with the proper load capacity.
- ✓ Ensure that a competent person has examined the ladder for deficiencies before use.
- ✓ Position portable ladders so the side rails extend at least 3 feet above the landing.
- ✓ Secure top side rails to a rigid support and use a grab device when 3 foot extension isn't possible.
- ✓ Maintain a 3-point contact (two hands and a foot, or a hand and two feet) when on ladder.
- ✓ Stay near the middle of the ladder and face the ladder while climbing up or down.
- ✓ Practice extra caution when getting on or off of the top or bottom of an extension ladder.

DO NOT:

- ⊘ Use a ladder on soft ground or unstable footing.
- ⊘ Climb with equipment in hand.
- ⊘ Stand on the top two rungs of a stepladder, or the top four rungs of an extension ladder.
- ⊘ Use a step ladder that is leaning against a wall.

Misuse of Portable Ladders (cont'd)

Ladder Type	Duty Rating	Use	Load
IAA	Special Duty	Rugged	375 lbs.
IA	Extra Duty	Industrial	300 lbs.
I	Heavy Duty	Industrial	250 lbs.
II	Medium Duty	Commercial	225 lbs.
III	Light Duty	Household	200 lbs.

Which ladder should I use for a job?

Select a ladder for a job based on the expected load capacity (duty rating), the type of work to be done and the correct height. As a general practice you should always ensure the ladder can support 4 times the intended weight.

Identify the hazard(s) in each photo and the corrective action

1) _____

2) _____

3) _____

4) _____

Fall Safety Quiz

True/False

1) Skylights are usually industrial grade and do not need to be guarded. _____
2) You should refrain from setting up fall arrest systems in high-wind conditions. _____
3) It is okay to mix different scaffolding types together as long as they are braced and secured to the building. _____
4) Most rebar caps that are available to purchase provide adequate protection from impalement. _____

Fill in the blank

1) Holes covers should be capable of effectively supporting _____ times the weight of any employees, equipment, and materials that may be imposed on the cover.
2) Always wear _____ and other PPE to protect from falling objects.
3) Use catwalks made of _____ whenever possible when constructing scaffolding.
4) Ladders should be positioned so that the top railing extends _____ feet past the top landing.

Multiple Choice

1) Maintain _____ points of contact when you are climbing up or down a ladder.

A) One B) Three

C) Two D) Four

2) Do not stand on the top ____ rungs of a stepladder, or the top ____ rungs of an extension ladder.

A) Two, Four B) Three, Two

C) Two, Three D) One, Four

3) Ladders should always be set up at least ____ feet from an overhead power line.

A) Three B) Five

C) Ten D) Fifteen

4) As a general rule of thumb, it is best to use rebar safety covers that are capable of withstanding at least ____ pounds being dropped from a height of ____ feet without defecting.

A) 250, Five B) 275, Fifteen

C) 175, Ten D) 250, Ten

5) You are required to use fall protection when exposed to a fall hazard of _____ feet or more.

A) Three B) Eight

C) Six D) Ten

Other Resources

Stopconstructionfalls.com is a campaign dedicated to increasing awareness of the high rate of fall-related injury and death in the construction industry. The goal of the campaign is to engage residential contractors by encouraging them to: A) Plan ahead to get the job done safely, b) Provide the right equipment, and C) Train everyone to use the equipment safely. The website includes:

- Structured training materials and ideas for employers to use for all 7 days of the Annual Stand Down Week.
- Fall safety literature, posters, and other outreach materials.

Kentucky FACE Program (http://www.mc.uky.edu/kiprc/face)

Kentucky FACE is a NIOSH-funded occupational fatality surveillance program that conducts active surveillance of workplace fatalities that occur in Kentucky. Investigations are carried out in select high-incident industries to determine the contributing factors and possible safety recommendations that could prevent such fatal injuries from recurring. These findings are made available in case reports, hazard alerts, and other safety training materials that employers are encouraged to utilize with their workers.

Ladder Safety App– NIOSH

This new app uses visual and audio signals to make it easier for workers using extension ladders to check the angle the ladder is positioned at, as well as access useful tips for using extension ladders safely. The app is available for free download for both iPhone and Android devices.

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Produced by the Kentucky Occupational Safety & Health Surveillance (KOSHS) Program. The KOSHS Program is located within the Kentucky Injury Prevention and Research Center (KIPRC), a bona fide agent for the Kentucky Department for Public Health.

Materials in this workbook were partially adapted from the *OSHA Falls Construction eTool*, found at: https://www.osha.gov/SLTC/etools/construction/falls/mainpage.html