



## FALL PROTECTION

## Objectives

Identify common fall hazards in the workplace.



Introduction to The Hierarchy of Fall Protection.



Methods of fall protection.



Fall Protection Planning.

## Employer responsibilities

### 29 CFR 1926 Subpart M

#### 1926.502 (a)(2)

- ▶ The employer **MUST** provide all fall protection for an employee. (FSS employees only allowed to use FSS fall protection)

#### 1926.503 (a)(1)

- ▶ The employer **MUST** provide a training program for each employee who might be exposed to fall hazards. The program must enable each employee to recognize the hazards of falling and must train each employee in the procedures to be followed to minimize these hazards. (FSS employees must take a refresher every 4 years)

## Competent Person

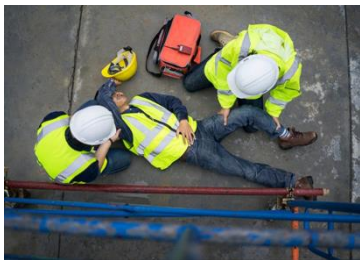
- ▶ Someone appointed by the employer who is capable of identifying existing and predictable hazards and authorized to take prompt, corrective measures to eliminate those hazards (can inspect,\*install, and use most fall protection)

## Qualified Person

- ▶ Qualified Person - One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems relating to the subject matter, the work, or the project.

(\*Horizontal Lifelines (HLLs) must be installed by a Qualified Person)

## What do we know about falls?




- ▶ Falls are among the most common cause of serious work-related injuries and deaths in construction

Bureau of Labor and Statistics (BLS) reported 1,053 construction fatalities in 2024.



Over 1/3 of those fatalities were from falls.



Non-fatal falls resulting in lost time, account for over 30% of all construction injuries.



## Why are Falls so Common?

- ▶ Lack of proper safety training
- ▶ Lack of required safety equipment
- ▶ Defective equipment
- ▶ Improper installation and use of safety equipment
- ▶ Poor work safety practices
  - ▶ Ex. Neglecting to reinstall guardrails after completing work

## Examples of fall hazards



- ▶ Unprotected Leading Edge
- ▶ Floor Holes
- ▶ Wall Openings
- ▶ Skylights

## Floor Holes



OSHA defines a hole requiring fall protection as any 2" or greater diameter hole in the ground.

- ▶ Hole covers must be able to support twice the weight of any employees, vehicles, equipment, or materials that may be imposed on the cover
- ▶ Covers must be secured to prevent accidental movement
- ▶ Covers shall be color-coded or marked with the word "HOLE" or "COVER"

## Why are Falls so Dangerous?

- ▶ It takes most people about a third of a second to realize they are falling, and another one-third for the body to react. During those two-thirds of a second, a body can fall seven feet and already may be moving fast enough to cause a serious injury.
  - ▶ The further the fall, the greater the impact, and greater the likelihood of injury or death.
- ▶ After a worker has fallen and has been caught by a fall protection harness, the threat to the worker is far from over.
  - ▶ Suspension trauma is the effect that occurs when the human body is held upright without any movement for 10 minutes or more. This could be fatal. Trauma Straps are intended to reduce the chance of suspension trauma.

## Why Falls and other Accidents Happen

- ▶ Complacency:
  - ▶ People tend to be cautious when performing an activity for the first time because the activity is unfamiliar. The worker will grow more confident with repeated performance of the activity.
- ▶ Lack of Training:
  - ▶ Poorly trained workers will be a danger to themselves and others around them
- ▶ Unsafe Work Habits:
  - ▶ Improper use of tools or safety equipment
  - ▶ Unidentified hazards
  - ▶ Working in a rushed or hurried manner
    - ▶ Workers must be productive, but the drive for productivity must never replace safety on the jobsite.

## Common Hazards That Require Fall Protection Planning

Removing a  
guardrails to  
complete scope

Working in a  
boom lift

Working at heights  
of 6' or higher  
with unprotected  
leading edge

Working near 18"  
or greater  
openings in walls  
without protection

Working near floor  
openings and  
skylights

# Fall Prevention vs. Fall Protection

- ▶ Fall prevention is the best method of avoiding a fall, by taking the hazard out of the equation all together.
- ▶ Fall protection involves the use of controls such as fall restraint or arrest systems designed to prevent falls or to protect against injury in the event of a fall.
  - ▶ Two types of fall restraint:
    - ▶ Passive - Does not require the worker to take any personal action to be protected from a fall
    - ▶ Active - Relies on the individual worker to perform a personal action to prevent falls or to protect against fall related injuries. Ex: Wearing a full-body harness and connecting to a secure anchorage point

## HIERARCHY OF FALL PROTECTION



**1** ELIMINATE THE HAZARD

**2** PASSIVE FALL RESTRAINT

**3** ACTIVE FALL RESTRAINT

**4** FALL ARREST SYSTEM

**5** CONTROLLED ACCESS ZONES



## #1 Eliminate

- ▶ Perform the work from the ground when feasible
- ▶ Prefab wall panels to tilt up
- ▶ Installing permanent stairs early in the project to avoid the use of ladders between floors

## #2 Passive Fall Protection Guardrails



## Guardrails



- ▶ Top Rail
  - ▶ 42 inches +/- 3 inches above the walking/working surface
  - ▶ Able to withstand 200 pounds of lateral force
  - ▶ At least 1/4 inch in diameter or thickness

## Guardrails



- ▶ Mid-Rail
  - ▶ Installed midway between the top rail & walking/working surface (typically 21 inches)
  - ▶ At least  $\frac{1}{4}$  inch in diameter or thickness
  - ▶ Able to withstand a lateral force of 150 pounds
  - ▶ May also be screens, mesh, or solid panels

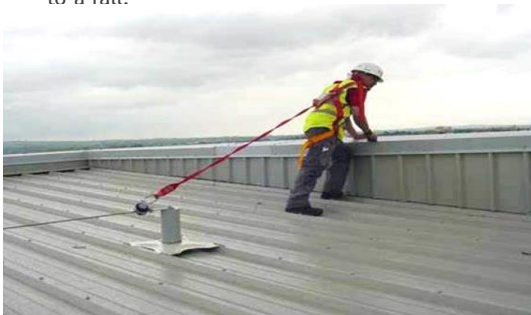
## Guardrails



- ▶ Toe board
  - ▶ At least 3 ½ inches high
  - ▶ Able to withstand a lateral force of 50 pounds

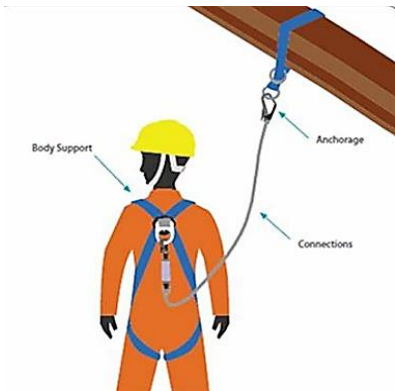
## #3 Active Fall Restraint System

- ▶ Stops the worker before they could be exposed to a fall.



\*A fall protection plan must be in place, read, and understood by each worker prior to beginning work

## #4 Active Fall Arrest - *Personal Fall Arrest System (PFAS)*



- ▶ Stops a person that has sustained a fall
- Two basic requirements of PFAS
1. Not injure the person while arresting the fall
  2. Arrest the fall before reaching the ground

**\*\*A fall protection plan must be in place, read, and understood by each worker prior to beginning work**

## Personal Fall Arrest Systems (PFAS)

- ▶ The human body can tolerate a maximum arresting force of 1,800 pounds
- ▶ PFASs must:
  - ▶ Limit the maximum arresting force to 1,800 pounds
  - ▶ Limit the employees' free fall to no more than 6 feet (must also not be able to contact any lower level)
  - ▶ Limit maximum deceleration distance to 3 ½ feet (SRL or Shock pack)

## Fall Protection Equipment

- ▶ Must be inspected prior to each use
- ▶ Must only be used for fall protection. Never use it to hoist materials
- ▶ Always follow manufacturer's instructions

## System Inspection

What to look for when checking your harness:

- All stitching is in good condition
- No pitting or corrosion of metal parts
- Straps are not frayed or torn
- Manufacturer's label is attached
- Harness has both hook and loop trauma straps installed



# Harness Fit



- 1 Ensure the sub-pelvic strap sits directly below the buttocks.
- 2 Ensure leg straps are not twisted or cross-buckled. They also need to be tightened snugly.
- 3 Ensure the chest strap is secured, tightened, and positioned the proper distance below the shoulder.
- 4 Ensure the dorsal D-ring is aligned with the spine and positioned between the shoulder blades.

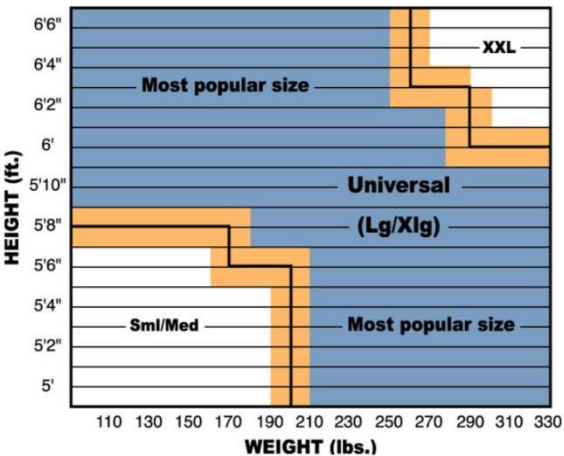
## Fall Protection Inspections

- Fill out an inspection form each time you use fall protection
- You can do this with a manual form from your supervisor or use this QR code for electronic inspections

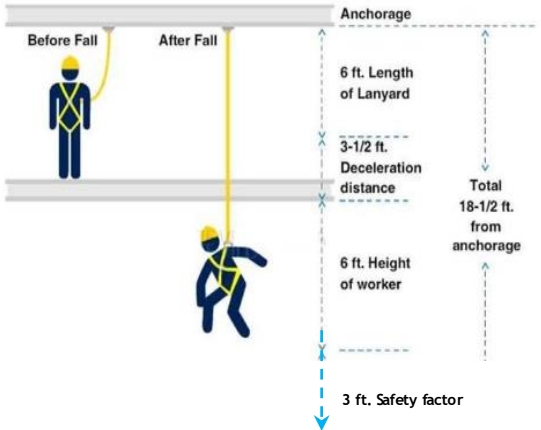


Harness size is determined by height and weight of worker

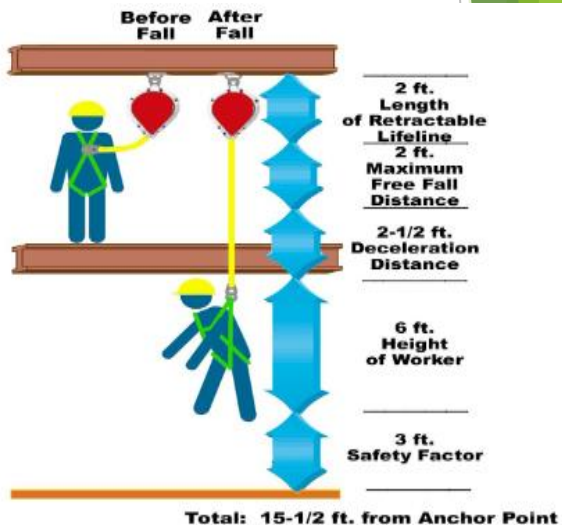
## HARNESS SIZING CHART



# Lanyard

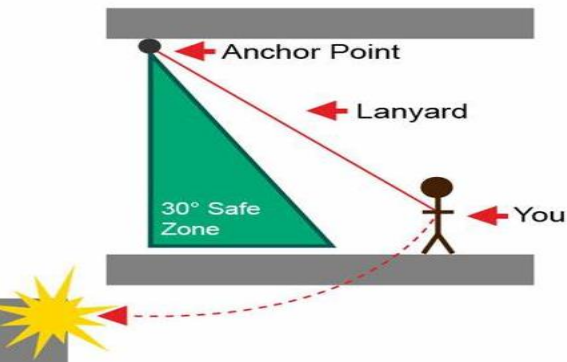


## Self retracting lifeline (SRL)



## Swing Fall

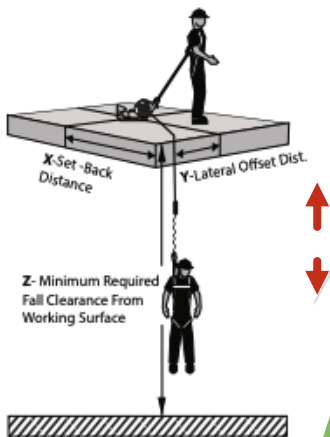
- Minimize your swing fall distance by working directly below your anchor
- Be aware of objects in your swing path
- Ensure your swing drop is no more than 4 feet
- Determine the clearance required



## Non-Overhead Anchorage

When your anchorage is below your D-ring, the Minimum Required Fall Clearance (MRFC) is calculated using five metrics as measured from the walking-working surface:

- SRL Deceleration Distance
- D-Ring Shift and Harness Stretch
- Safety Factor (3ft)
- Dorsal D-ring Height
- Swing Fall. Add the Dorsal D-ring height from the deck to account for tying off below the D-ring.



## Horizontal Lifelines

- ▶ Fall protection system that uses a cable, web, or synthetic rope or a rail system, and is attached to two or more anchor points.
  - ▶ Can provide Fall Arrest, or Fall Restraint depending on the configuration
  - ▶ Must be installed by a Qualified Person
  - ▶ Must be installed per manufacturers instruction



## Horizontal Lifelines Cont.

- ▶ Any load on a horizontal lifeline will cause it to deflect, or sag. The sag angle is the angle of deflection when the lifeline is subjected to a load, such as a falling worker.
- ▶ Reducing the sag angle increases the force on the line during a fall
  - ▶ Ex. When the sag angle is  $15^\circ$ , the force on the lifeline and its anchorages is subjected to a load of about 2:1; when the sag angle is decreased to  $5^\circ$ , the force increases to about 6:1
- ▶ To reduce the load on a horizontal lifeline, the sag angle should be increased

## Anchorage



- ▶ An anchorage is a secure point of attachment for lifelines, lanyards, and deceleration devices
- ▶ Any anchorage used as a tie off point for a fall protection system must be able to support 5,000 pounds per person attached
- ▶ Each component of the system must have a 5,000-pound

## Fall Protection Plan

- ▶ Written by a Competent Person (Typically a foreman)
- ▶ Understood by all parties involved in the task
- ▶ Must include a detailed rescue plan

## Rescue Plan

A variety of techniques can be used to rescue a fallen worker. As the complexity of the rescue increases, so do the risks.

### ▶ Self-Rescue

- ▶ Ideally, fallen workers can climb or pull themselves to safety. It is usually the quickest and safest option. Decent devices are a common self-rescue aid. (Consider however, the worker could be unconscious and could need further assistance)

### ▶ Assisted Self-Rescue

- ▶ If the worker is conscious have a ladder near the task area and a spotter to assist the fallen worker

### ▶ Mechanically Aided Rescue

- ▶ Have an MEWP on standby to assist a fallen worker

## Key Take Aways

1

Be aware of your environment and what fall hazards are present

2

Mitigate hazards and plan to work safely

3

Use the Hierarchy of Fall Protection to plan your work safely

4

A Fall Restraint system prevents a worker from reaching a fall hazard

5

A Fall Arrest system stops a worker who has fallen from hitting the ground and minimizes arresting forces imposed on the body



D-Rings are too low on the back



Workers are attached to each other

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