



# **Lunch Box Safety Webinar**

*Safety Over Sandwiches*

**March 5**

**Fall Protection and Ladder Safety**

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*Presented by Joe Mlynek, Progressive Safety Services LLC*

# Today's Discussion

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Passive Fall Prevention



Fall Restraint



Fall Arrest



Ladders

# Fall Related Incidents

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Approximately 20% of workplace fatalities; disabling injuries, and lost workdays

Approximately 200,000 lost workday and disabling injuries per year

# Walking-Working Surface Standard

## Subpart D

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1910.21	Definitions
1910.22	General requirements
1910.23	Ladders
1910.24	Steps bolts and manhole steps
1910.25	Stairways
1910.27	Scaffold and rope descent systems
1910.28	Duty to have fall protection and falling object protection
1910.29	Fall protection systems and falling object protection – criteria and practices
1910.30	Training requirements

# Fall Protection

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## 1910.28 (b)(1)(i)

- Rule allows employer to select a fall protection system that works best for them. This can range from:
  - Guardrail systems
  - Safety net systems
  - Personal fall arrest systems
  - Positioning systems
  - Travel restraint systems
  - Ladder safety systems

These systems can be used in place of guardrails, but remember these systems have limitations (clearance distances, anchorage requirements, etc.)





# Passive Fall Prevention



**Hierarchy of Fall Protection**

# Passive Fall Protection

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## Best example – Guardrail

Once a guardrail is installed it doesn't need to be altered to prevent access to the leading edge or fall hazard.

**Leading edge** means the unprotected side and edge of a floor, roof, or formwork for a floor or other walking/working surface (such as deck) which changes location as additional floor, roof, decking or formwork sections are placed, formed or constructed.





# Passive Fall Prevention

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Eliminates the hazard all together

4 foot – General Industry “The Forty-Eight Inch Rule”



# Guardrails

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Top-rails must be 42 inches above the walking/working surface

- 200 lbs. force in any direction
- (+/- 3 inches)

Intermediate rails 21 inches

- 150 lbs. of force in any direction



# Falling Object Protection

## 1910.28 (c)

- Requires employers to protect workers from being hit by falling objects by using one or more of the following falling object protection measures:
  - Toeboards, screens or guardrail systems;
  - Canopy structures
  - Barricading the area and prohibiting workers from entering the barricaded area
- Toeboard height must be a minimum of 3.5 inches (old construction standard - 4 inches)



# Opening/Holes

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*Opening* means a gap or open space in a wall, partition, vertical walking-working surface, or similar surface that is at least 30 inches (76 cm) high and at least 18 inches (46 cm) wide, through which an employee can fall to a lower level.

Hole - means a gap or open space in a floor, roof, horizontal walking-working surface, or similar surface that is at least 2 inches (5 cm) in its least dimension.

# Hole

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Need to be guarded/protected:

- Standard Railing – Permanent or temporary
- Hinged floor opening cover
- Cover







# Safety Gates

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Ensure each employee is protected from falling into a ladderway, floor hole, or ladderway platform hole by a guardrail system and toeboards erected on all exposed sides, except at the entrance to the hole where a self-closing gate or an offset must be used. OSHA 1910.28(b)(3)(iv).



# One Minute Focus



A warehouse worker was fatally injured after falling seven feet from a wooden pallet elevated by a forklift. The warehouse inventory was stored on steel storage racks with the highest shelves about eight feet above the concrete floor. It was common practice for warehouse workers to place one foot or both feet on a pallet and move inventory on the top shelf (see Figure 1) while a coworker lifted them to the top shelf using the forklift, even though the equipment was not designed for this purpose. At the time of the incident, the worker slipped on the pallet while moving inventory and fell. The worker was taken to the hospital where he died from his injuries a few days later.



Source: [www.osha.gov](http://www.osha.gov) (fatal facts)



# Restraint



## Hierarchy of Fall Protection



# Fall Restraint

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A tie off system that “restrains” the employee from falling

Does not allow the worker to access the fall hazard



# Fall Restraint

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Consists of an anchorage point

- 1,000 lbs.. (ANSI Z359) static load per person

Full-Body Harness

Connector

- Adjustable Restraint Lanyard Preferred



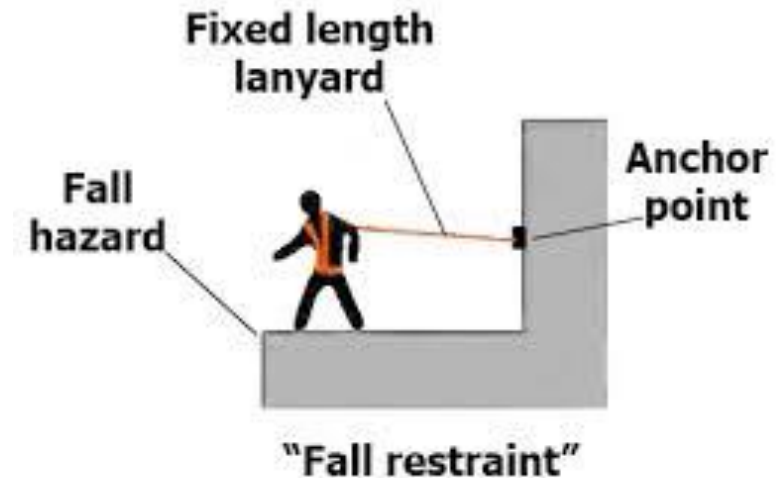
# Fall Restraint

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Must keep ample distance from the leading edge

**Leading edge** means the unprotected side and edge of a floor, roof, or formwork for a floor or other walking/working surface (such as deck) which changes location as additional floor, roof, decking or formwork sections are placed, formed or constructed.

Must not allow persons center of gravity to move past leading edge



# Fall Restraint Benefits

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Does not allow a person to be exposed to a fall

Anchorage point requirements of 1,000 lbs. (ANSI 359)

No fall, no rescue!





# One Minute Focus

A worker was climbing down a 400-foot telecommunications tower when he lost his footing. The ladder safety device or system (consisting of the carabiner, carrier rail, safety sleeve and body harness) he used failed to arrest his fall. The safety sleeve did not activate correctly to stop the worker's fall, the chest D-ring ripped out of the body harness, and he plunged 90 feet to his death. Likely Causes of Incident

- The worker did not receive proper training on the ladder safety device he used.
- The pawl of the sleeve was defective. The defect prevented the device from activating properly to stop a fall within 2 feet (.61 meters) of its occurrence (29 CFR 1926.1053(a)(22)(iii)). This was identified in a safety notice issued after the incident and as a result of OSHA's investigation.
- The weight of the worker, his tools and equipment was more than the 310-pound rating of the body harness.
- The safety sleeve was connected to the harness at the chest D-ring instead of to the navel D-ring as specified by the manufacturer of the ladder safety device.
- The body harness was not a component of the manufacturer's ladder safety device.

Source: [www.osha.gov](http://www.osha.gov) (fatal facts)



*Figure 1: Components (parts) of a ladder safety device [fall protection equipment].  
(Illustrates correct navel D-ring to safety sleeve connection for this specific device.)*

# Personal Fall Arrest Systems





# Personal Fall Arrest System(PFAS)

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Designed to stop a fall once it has already begun

Bring an employee to a complete stop and limit deceleration distance:

- 3.5 feet with a traditional energy absorbing lanyard
- 24 inches for Self- Retracting Lifeline



# Arresting Forces

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Personal fall arrest systems must limit arresting forces to 1800 lbs. when used with a full body harness

Energy absorbing mechanisms should be used for fall arrest

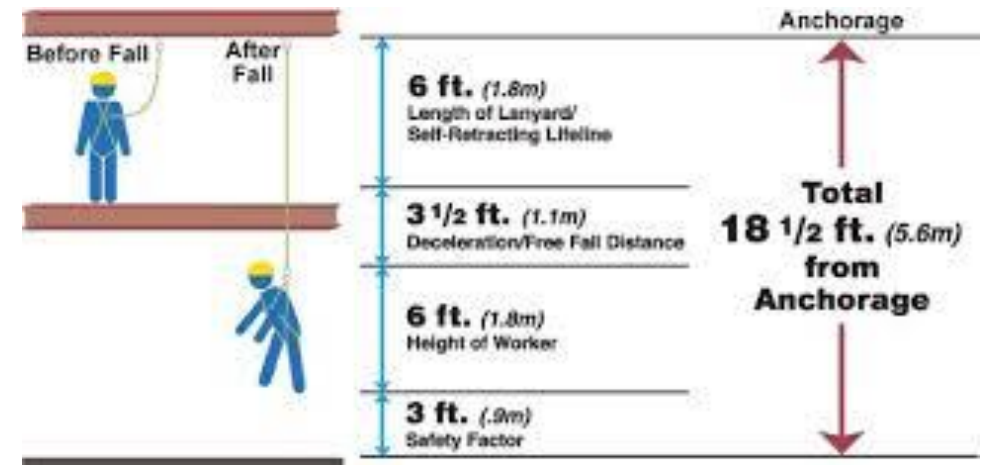


# Free Fall Distance

Distance a body falls before the fall arrest system activates

Must not exceed 6 feet or contact w/lower level or obstruction

- Up to 6 ft. lanyard
- Less than 2 feet SRL



# Basic Pieces of Fall Arrest System

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Anchorage/(Anchorage Connector)

Full-Body Harness (Body Wear)

Connector (Connecting Device)



# Personal Fall Arrest System

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Activates upon a fall

Stops Fall

May prevent serious injury



# Anchorage

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OSHA – “Anchorages used for attachment of personal fall arrest equipment shall be capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed and used as follows:

as part of a complete personal fall arrest system which maintains a safety factor of two.

Under the supervision of a qualified person.”

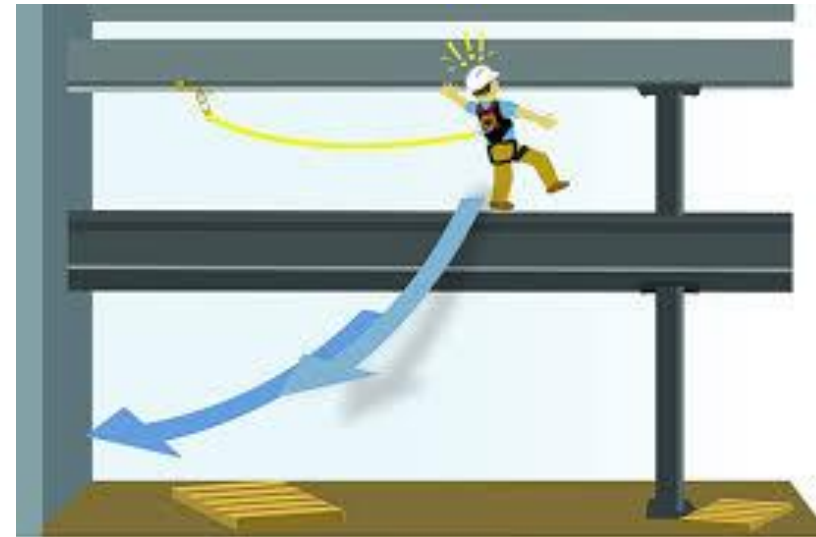
Often referred to as “certified anchor points” or “engineered systems.”

# Anchorage - Swing Fall Hazard

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When possible choose an anchor point above the head

If not positioned overhead a pendulum effect will occur



# Rope Descent Systems

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1910.127

- Building owner must affirm in writing that permanent building anchorages used for rope descent systems have been tested, certified and maintained as capable of supporting 5,000 pounds for each worker attached.
- Skyclimber units
- CSE rescue anchorage points





# Full-body Harness

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Disperses forces of fall arrest over the chest, thighs, pelvis and shoulders

Connected to anchorage by a lanyard (Dorsal D-Ring)

D-ring tensile strength of 5,000 lbs.



# Harness – D-Ring Locations

Back – Fall Arrest/Restraint

Frontal – Ladder Climbing/Descent Control

Shoulder – CSE Entry/Rescue/Retrieval

Hips - Positioning



# Connectors

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Shock/energy absorbing

Self retracting lifelines (SRL)

All must have double action locking hooks w/tensile strength of 5,000 lbs.



# Connectors

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Do not connect two snap hooks together (roll out)

Be aware of sharp edges. Guard sharp edges with a protective materials.

Do not use two lanyards attached to a dorsal D-ring in place of a dual legged lanyard.



# Why Use an Energy Absorbing Lanyard?

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Forces=  $W \times D$

Body Weight ---( $W$ )

Free Fall Distance---( $D$ )

Example: A 220 lb. worker falling 6 feet can generate fall forces of 1,320 lbs. across the worker's body.

Without adequate deceleration or shock absorbers this could cause serious injuries

· **Shock absorbing web lanyard with 220 pound steel weight**

<b>Distance of Drop</b>	<b>Average Force</b>	<b>Extension</b>
3 feet	820 pounds	21 inches
4 feet	810 pounds	22 inches
5 feet	822 pounds	28 inches
6 feet	872 pounds	33 inches
7 feet	877 pounds	38 inches
9 feet	1315 pounds	41 inches
10 feet	1654 pounds	42 inches
11.5 feet	2332 pounds	42 inches

1320 lbs. – 872 lbs. = 448 lbs. of force

# Fall Arrest System

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Full Body Harness  
Attached @ D-Ring

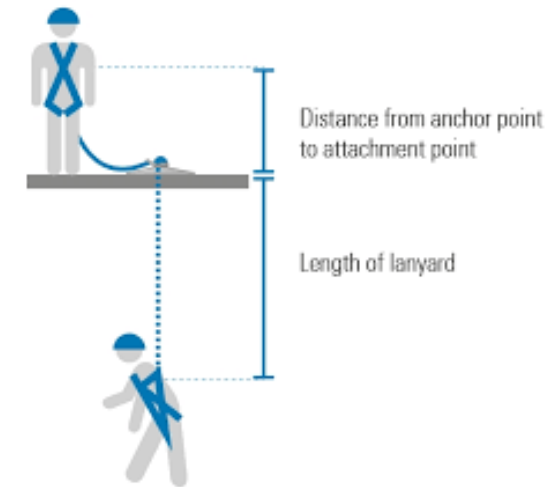
Anchorage

Connector  
(Lanyard)



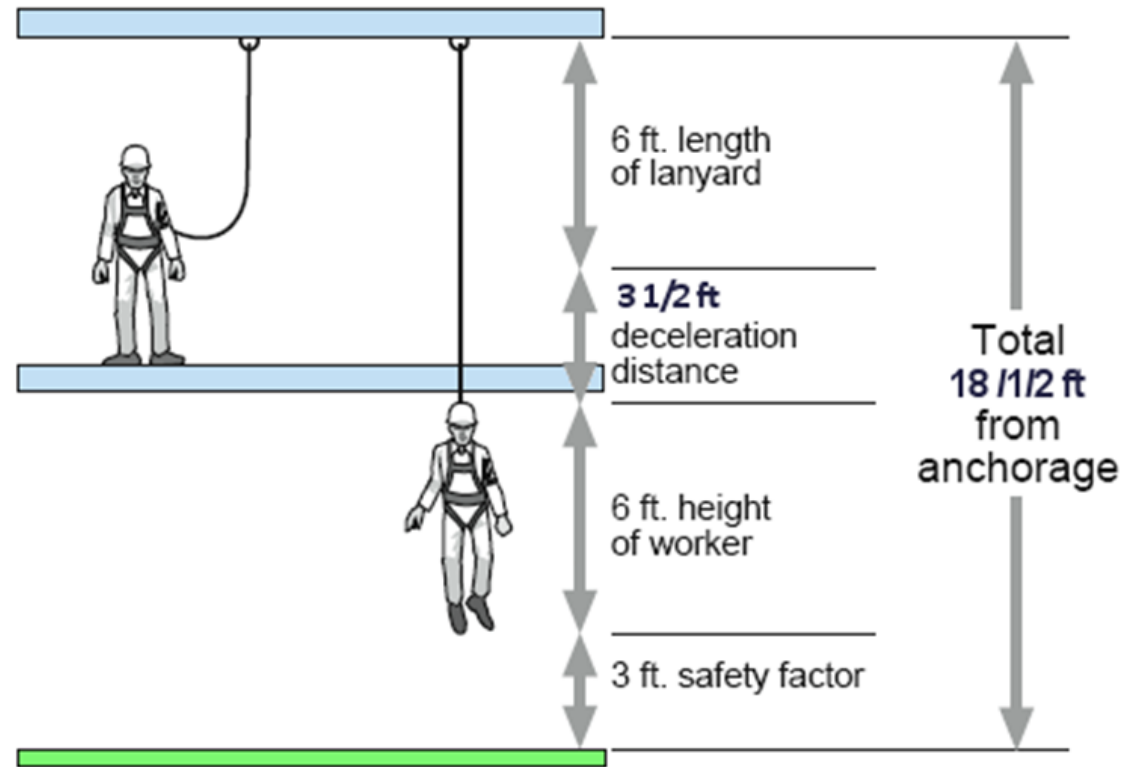
# Calculating Required Clearance/Total Fall Distance

Free Fall Distance	= 6 ft.
<u>+ Deceleration Distance</u>	<u>= 3.5 ft.</u>
Total Fall Distance	9.5 ft.
+ Height of the Worker	= 6 ft.
<u>+ Safety Factor</u>	<u>= 3 ft.</u>
<b>Required Clearance</b>	<b>=18.5 ft.</b>



Assume: 6 foot energy-absorbing lanyard anchored above the head





*How to determine total fall distance with a shock-absorbing lanyard.*

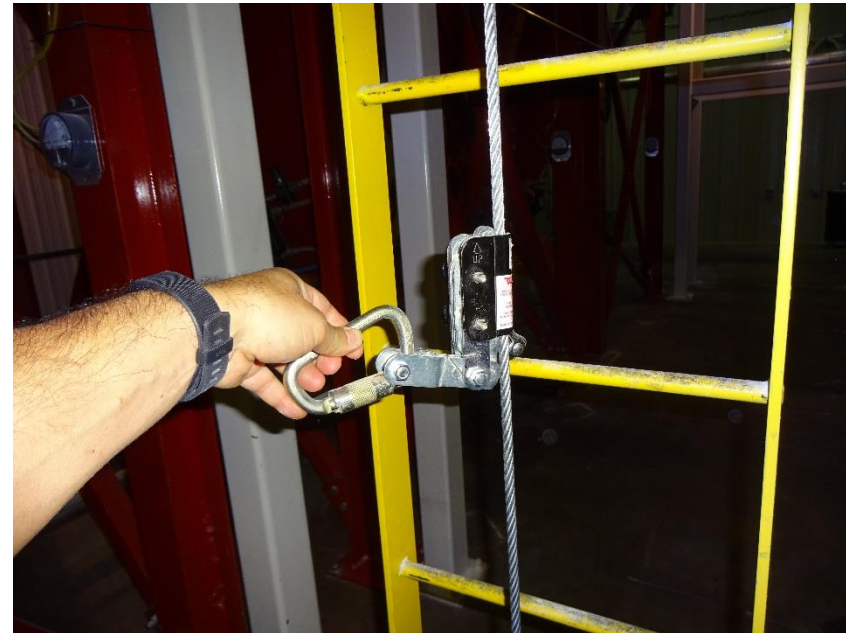
# Vertical Lifeline

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Travel Freely

Automatically locks to arrest a fall

Example: Rope Grab/ladder safety device



# Horizontal Lifeline

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Rated for correct number of persons

Used accessing rolling stock (i.e. railcars, tops of tankers, barges etc.)



# Horizontal Lifelines

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Rigid or Flexible

Attach prior to stepping on to car or climbing ladder

Tug and walk technique

Retract when not in use (stress on retraction springs)



# Rescue

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Employer shall provide prompt rescue of employees in the event of a fall or ensure that employees are able to rescue themselves.

- In-house Equipment
- Local First Responders

Orthostatic Intolerance/Suspension Trauma



# Rescue

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Trauma Straps

Ladders

Aerial Lifts

Crane Basket

Ropes/Retrieval Systems

First Responders

Coworker – Never Work Alone!



# Inspection

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CARING FOR AND INSPECTING EQUIPMENT



# Inspections

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Before each use (after) inspect lanyards, SRL and harnesses:

- Cuts
- Frays
- Damage
- Cracks
- Burns
- Impact indicator





# Inspections

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Annually by a competent person (ANSI Z359)

“competent person” courses offered by fall protection companies

Competent Person (OSHA) "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them"



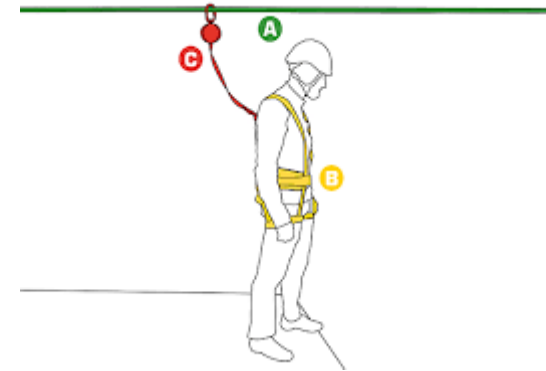
# Inspections

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Personal fall protection systems and components subjected to impact loading should be taken out of service until:

- Inspected by a competent person
- Determined to be undamaged and suitable for use

If equipment is not useable, make it unusable.



# Maintenance

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Clean full body harness with water and mild soap solution

Do not use bleach or bleach solutions

Air Dry

Store full body harness in a cool, dry, clean environment, out of direct sunlight

Many factors can damage a harness:

- Chemicals
- Extreme heat
- Sunlight

# Ladder Safety

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FIXED AND PORTABLE LADDERS

# Ladders – 1910.23

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Falls from ladders account for approximately 20% of general industry injuries:

## Updates within new standard:

- Ladders must be capable of supporting the maximum intended load
- Ladders must be inspected before initial use in each work shift
- Ladders with structural defects must be immediately tagged “Dangerous: Do Not Use” or similar language

# Ladders – 1910.23

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Used for the purpose intended

Face the ladder when climbing up and down

Use at least one hand to grasp the ladder when climbing up and down



# Ladders - 1910.23

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Extend at least three feet above the landing surface

4:1 Ratio portable ladders

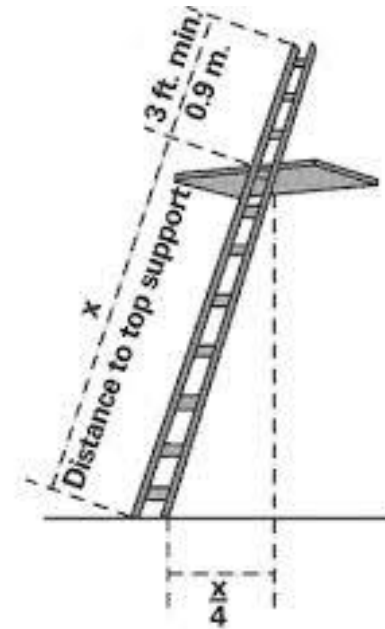


Figure D-1 -- Portable Ladder Set-up

# Ladders 1910.23

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No employee carries an object or load that could cause the employee to lose balance or fall while climbing up or down the ladder

Ladders must be used only on stable and level surfaces unless they are secured or stabilized to prevent displacement.

No ladder can be moved, shifted or extended while and employee is on it.



# Ladders 1910.23

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Ladders placed in locations such as passageways, doorways, or driveways where they can be displaced by other activities or traffic:

- Secured to prevent accidental displacement
- Guarded by a temporary barricade (traffic cones, caution tape, etc.)

The cap and top of a stepladder cannot be used as a step



# Ladders 1910.23

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Portable ladders used on slippery surfaces must be secured or stabilized

The top of non-self supporting ladders must be placed so that both side rails are supported

Ladders and ladder sections cannot be tied together to provide added length unless specifically designed for such use.

# Ladder Inspections (fixed/portable)

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Do not need to be documented, however how do you prove that the inspection took place?

- Compliance officer could ask employees if they inspect ladders prior to use. If they say no, a citation may be issued.
- Recommend addressing this during training and consider documenting inspections as part of daily JSA process

# Fixed Ladder Fall Protection

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Final rule phased in requirements to equip fixed ladders, which extend over 24 feet, with ladder safety or personal fall arrest systems

The rule prohibits the use of cages as a means of fall protection after the 20 year phase in period

OSHA does not believe cages or wells prevent workers from falling from fixed ladders or protect them from injury if a fall occurs

# Fixed Ladders

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## Ladder safety system

- Designed to reduce the possibility of falling from a ladder. The system consists of a:
  - Carrier
  - Safety Sleeve
  - Lanyard connector
  - Body Harness



## Personal Fall Arrest System (OSHA)

- A system an employer uses to provide protection from falling or to safely arrest an employee's fall if one occurs (i.e. SRL)



# Phase-In Periods for Fixed Ladders

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## Phase 1 – November 19, 2018 (Past)

- Employers must ensure that each fixed ladder over 24 feet in height, installed before this date is equipped with a personal fall arrest system, ladder safety system, cage or well
- All newly installed fixed ladders >24 feet and replacement ladders after this date must be equipped with ladder safety or personal fall arrest systems
- Cages will no longer be accepted as a means of fall protection after this date



# Phase-In Period for Fixed Ladders

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## Phase II – November 18, 2036

- On and after this deadline, all fixed ladders >24 feet in height must be equipped with personal fall arrest or ladder safety systems.



# Fixed Ladders

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The employer must ensure ladder sections having a cage or well:

- Are offset from adjacent sections; and
- Have landing platforms provided at maximum intervals of 50 feet.





# Compliance Suggestions

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Compile an inventory of all fixed ladders

Assign an identification number/code to each ladder

Indicate height and type of fall protection system in place (if applicable)

Develop deadlines for addressing fall protection requirements based on the phase-in periods

Make sure contractors (design/build) are versed in the new requirements

# Emergency Use Ladders

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1910.23 (a) The employer must ensure that each ladder meets the requirements of this section. This section covers all ladders, except when the ladder is:

- Used in emergency operations such as firefighting, rescue, and tactical law enforcement operations.
- Suggested compliance actions:
  - Label emergency use ladders “ Emergency Use Ladders”
  - Ensure ladder sections do not exceed 24 feet in height or equip with a ladder safety device.
  - Train employees – appropriate use of emergency ladders

# Wrap-Up

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Supervisor Talking Points

Quiz

# Additional Information

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<https://www.osha.gov/walking-working-surfaces>

- Frequently asked questions
- Regulatory text
- Fact sheet

Conn, Maciel, and Cary LLP

Webinar “OSHA’s Slips Trips and Falls Gets a Facelift”, February 8, 2017

Webinar “Lessons Learned from OSHA’s Updated Walking-Working Surfaces Rule”, Sept. 18, 2018

- Recording available at [www.connmaciel.com](http://www.connmaciel.com)

NGFA Guidance Document

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# Questions?

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Whether an employer must equip a fixed ladder or ladder sections with fall protection depends on the height the ladder extends above a lower level, and thus the distance a worker on the ladder could fall, not the length of the particular ladder section. Section 1910.28(b)(9)(i) requires that employers equip fixed ladders with personal fall arrest or ladder safety systems if the ladder extends more than 24 feet above a lower level. For example, if a multiple section or side-step ladder extends more than 24 feet above the ground, the employer must equip the entire ladder with personal fall arrest or ladder safety systems. Although the length of each section of the ladder may be less than 24 feet, a worker on that ladder could fall more than 24 feet. OSHA also notes that §1910.28(b)(9)(ii)(A) requires that employers must ensure that a fixed ladder equipped with a personal fall arrest or ladder safety system on more than one section provides protection for the entire vertical distance of the ladder, including all ladder sections.”

# Rolling Stock

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Miles Memo still in effect (1996):

“Additionally, it would not be appropriate to use the personal protection equipment standard, 29 CFR 1910.132(d), to cite exposure to fall hazards from the tops of rolling stock, unless employees are working atop stock that is positioned inside of or contiguous to a building or other structure where the installation of fall protection is feasible. In such cases, fall protection systems often can be and, in fact, are used in many facilities in the industry. ”