

Walking and Working Surfaces



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Objectives

- Discuss hazards in the workplace associated with walking and working surfaces.
- Discuss best practices for eliminating or controlling hazards associated with walking and working surfaces in the workplace.



Walking and Working Surfaces Slips, Trip, Falls

Make up the majority of general industry accidents

- 200,000+ serious (lost-work) injuries
- Over 95 million lost-workdays annually
- They account for 36% of emergency room visits and 65% of lost workdays.
- Nearly 700 fatalities a year (46,653 at work + at home)
- Account for 16% of all accidental deaths, second only to motor vehicle crashes.



Top Ten Lists

OSHA / BLS

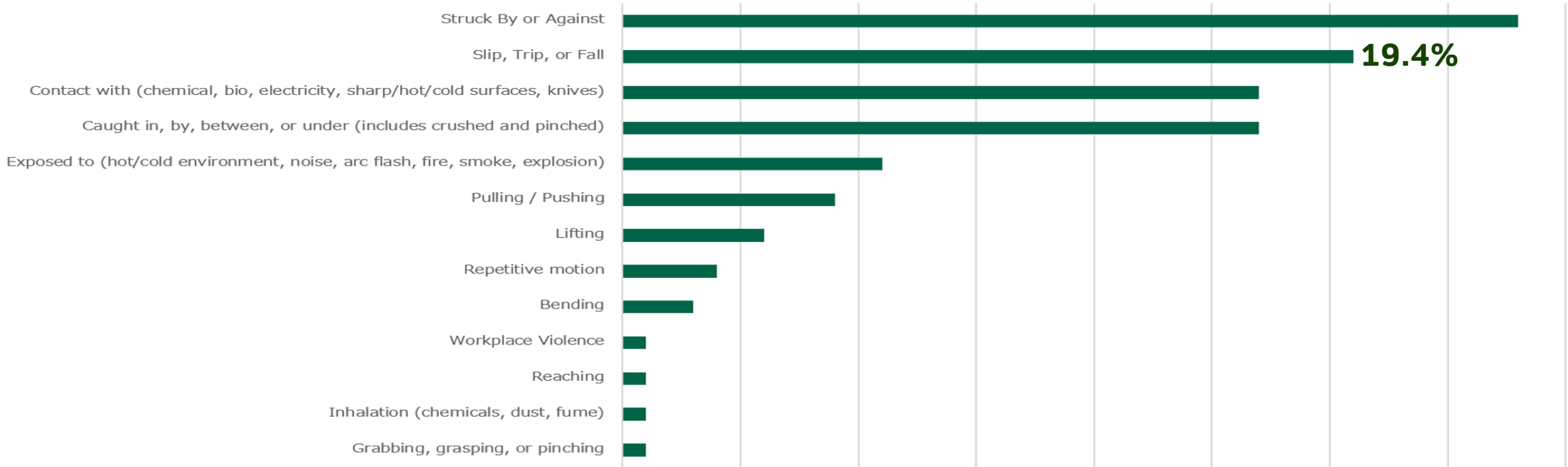
1. Slip and fall
2. Struck by moving object
3. Struck against stationary objects
4. Overexertion
5. Repetitive motion injuries
6. Electrocution
7. Entanglement
8. Motor vehicle accidents
9. Falls from heights
10. Workplace violence

United Kingdom

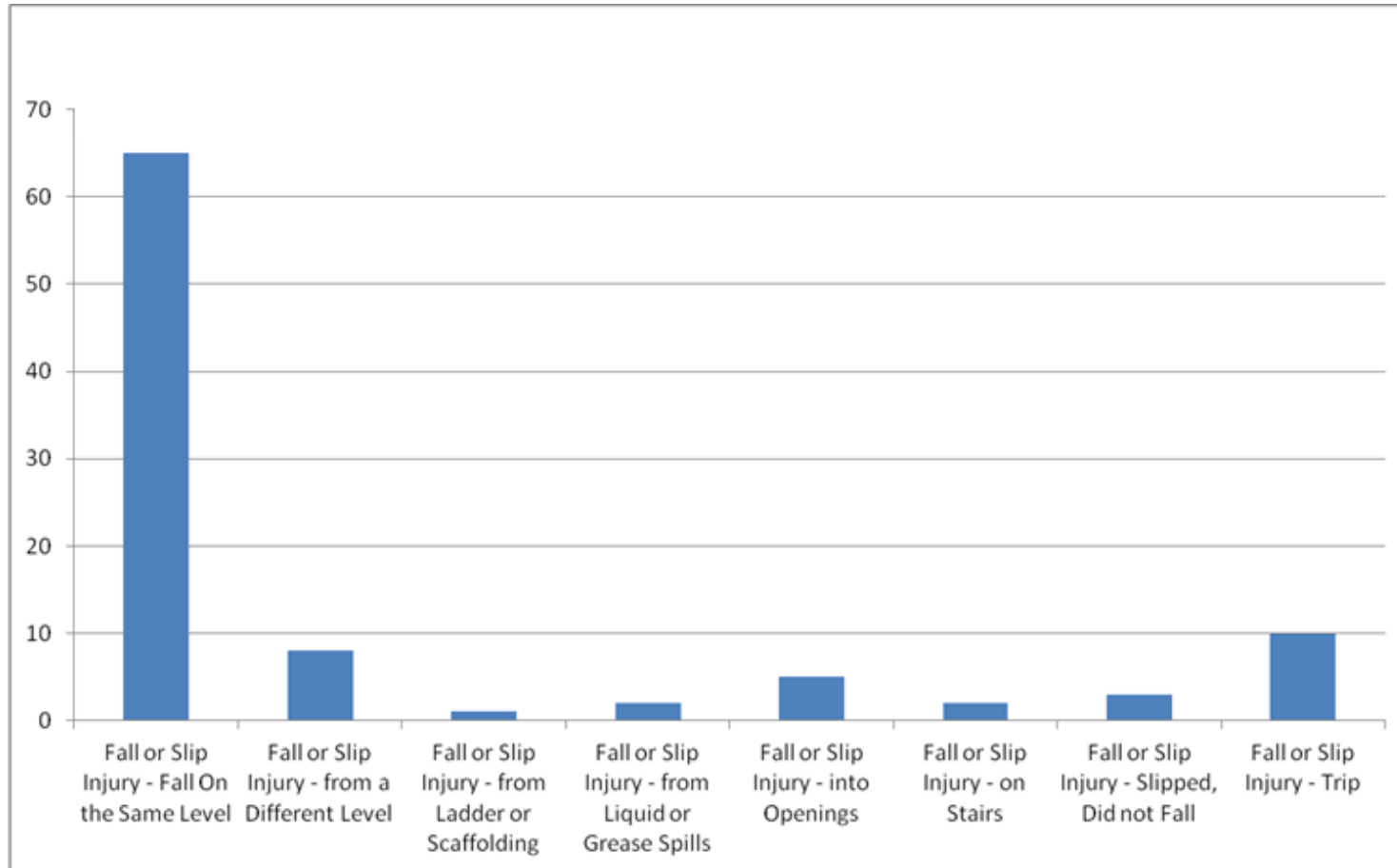
1. Slips, trips, falls
2. Falling objects
3. Handling, lifting, carrying
4. Acts of violence
5. Repetitive strain injury
6. Exposure to loud noises
7. Exposure to toxic fumes
8. Burns
9. Vehicle collisions
10. Cuts and lacerations



Recordable by Type

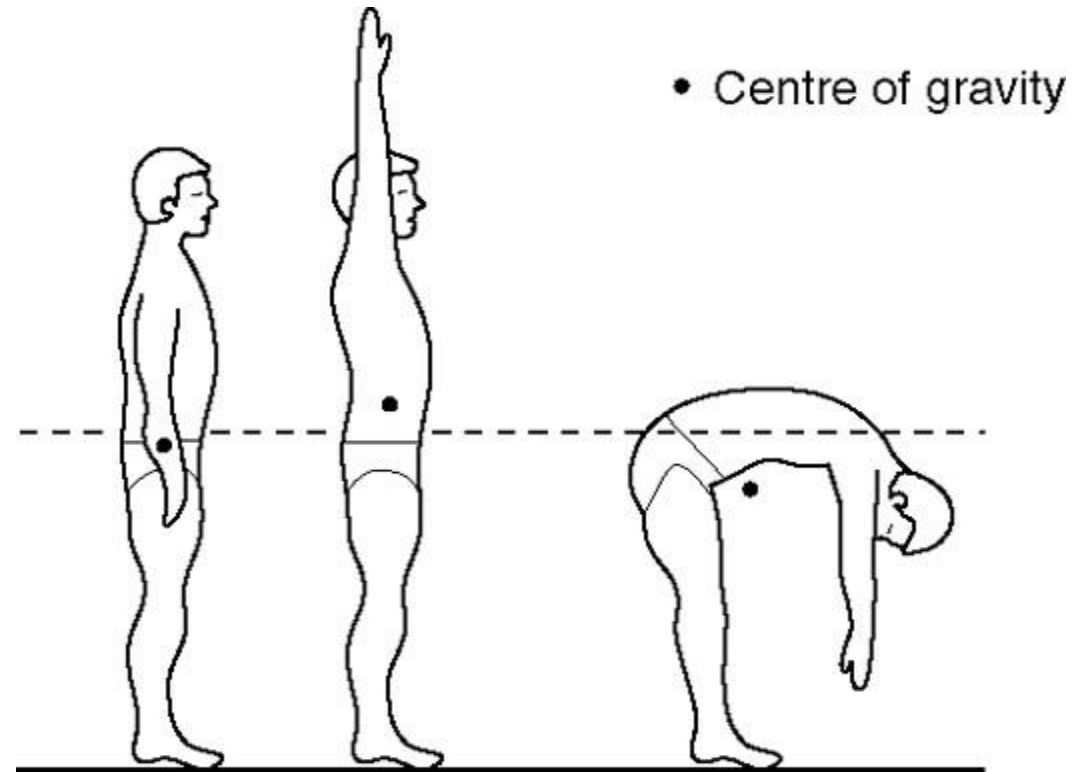


Fall Injuries by Type



Center of Gravity

- Understanding your center of gravity is important to avoid slips and to keep trips becoming a fall.
- All the movements we do successfully depend on where our personal center of gravity is around our bodies.
- Keeping your balance means keeping your center of gravity at its most stable point.



Traction

The most basic element of prevention for slips and trips is keeping your traction or grip on the walking surface.

- Wearing the right footwear
- Engineer the surfaces to provide good traction
- Housekeeping – cleaning up spills.



Slips, Trips, Falls

Nearly all slips, trips, falls have one or more of these factors as a contributing factor:

- substandard walking surface
- surface contaminants
- substandard footwear
- walking style of the person

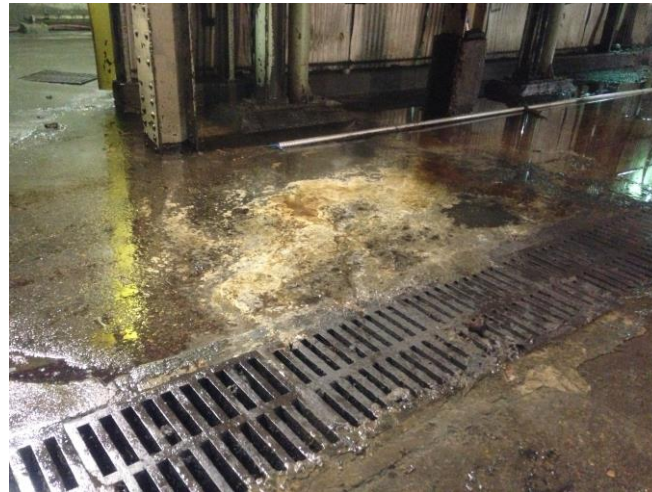
Slips

- Are a loss of balance caused by too little friction between your feet and the surface you walk or work on.
- The foot loses traction with the ground, causing the foot to slide uncontrollably.



Slip Hazards

- Grease, oil, water, ice, snow, liquid spills, or polished floors
- Improper footwear



Slip Hazards

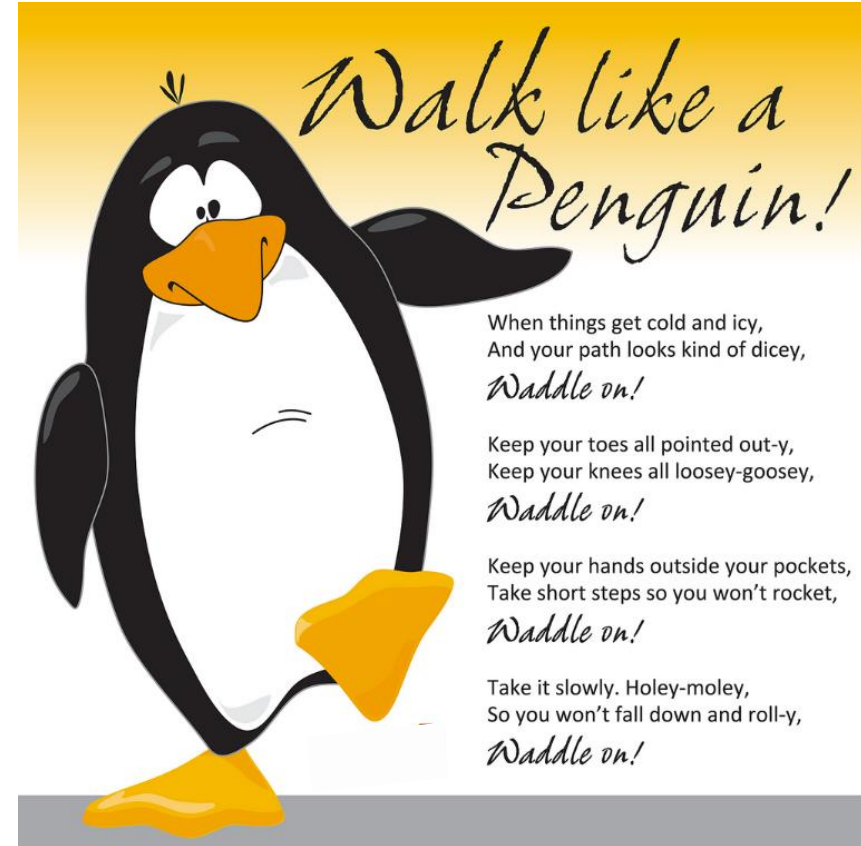


Slip Hazards



Controlling Slip Hazards

- Keep walking/working surfaces as clean and dry as possible.
- Make sure your footwear is as slip resistant as possible.
- Utilize drainage for wet operations.
- Clean up or mark and report spills.
- Remove ice and snow frequently and regularly.
- Remember the penguin walk – feet slightly spread out, short steps, body slightly bent, walk flat-footed and arms extended out to your side.



Controlling Slip Hazards



Slips, Trips, Falls

Nearly all slips, trips, falls have one or more of these factors as a contributing factor:

- substandard walking surface
- surface contaminants
- substandard footwear
- walking style of the person

Trips

- Occur whenever your foot hits an object and you are moving with enough momentum to be thrown off balance.
- The foot catches on an object, causing the person to lose their balance.



Trip Hazards

- Poor housekeeping
- Loose flooring, carpeting, or uneven surfaces
- Cords, hoses, open draws, or other protruding items



TRIP Hazards



Controlling Trip Hazards

- Aisles and passageways should be well-lit, clean, and marked.
- Material storage and work-related scraps shouldn't create trip hazards.
- Trip hazards, such as loose flooring, carpeting, uneven surfaces, and protrusion hazards, should be repaired or reported.
- Hoses and cables should be routed away from active work zones and walkways.



Slips, Trips, Falls

Nearly all slips, trips, falls have one or more of these factors as a contributing factor:

- substandard walking surface
- surface contaminants
- substandard footwear
- walking style of the person

Falls

- Occur whenever you move too far off center of balance.
- The person's center of gravity shifts, and they lose their balance, causing them to fall rapidly to the ground or a lower level.



Fall Hazards

- Elevated surfaces – top of tanks, towers, machines, platforms, runways, or other elevated surfaces
- Lower-level surfaces – open pits, tanks, vats, or ditches



Fall Hazards

Structural collapse

- structurally unsound surfaces, and/or
- exceeding load limits.



Fall Hazards



Controlling Fall Hazards

Tanks, towers, machines,
and other elevated surfaces:

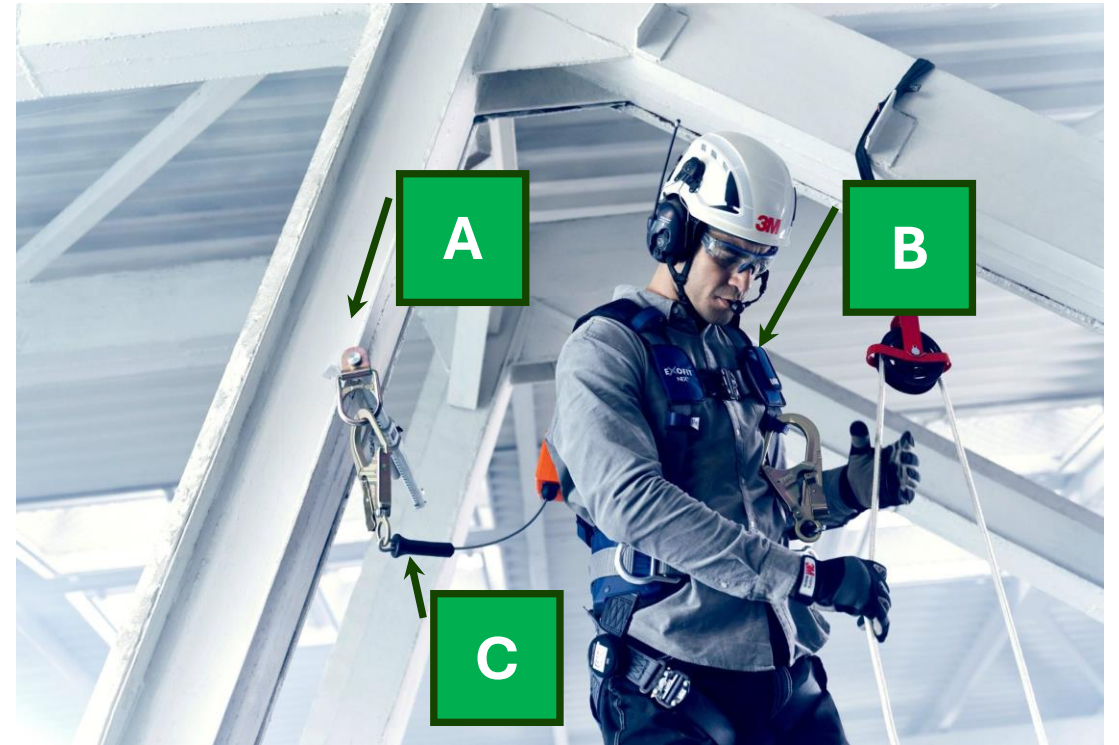
- It is best to engineer out the need to go up in the first place.
- Guardrails are often used, whether temporary or permanent.
- As a last resort, use a Personal Fall Arrest System (PFAS).



Controlling Fall Hazards

Personal Fall Arrest Systems

- Anchorages
- Body harness
- Components
(connectors like snap hooks or D-rings, connection points, lanyards, deceleration devices, lifelines, etc.)



Installed, used, and maintained according to the manufacturer.



Controlling Fall Hazards



Open-sided platforms and runways:

- Use proper guardrail system at all times.
- Platforms and runways next to dangerous operations require standard railings, regardless of height.



Controlling Fall Hazards



Structural collapse:

- Ensure walking/working surfaces are structurally sound.
- Surfaces must be able to support intended/potential load, including people, equipment, and stored materials.
- Load limits must be posted.



29 CFR 1910 Subpart D (Revised Nov-2016)

29 CFR 1910 Subpart D - Walking-Working Surfaces

- 1910.21 - Scope and definitions
- 1910.22 - General requirements
- 1910.23 - Ladders
- 1910.24 - Step bolts and manhole steps
- 1910.25 - Stairways
- 1910.26 - Dockboards
- 1910.27 - Scaffolds 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
- 1910.30 - Training requirements



Walking-working surface means any horizontal or vertical surface on or through which an employee walks, works, or gains access to a work area or workplace location.

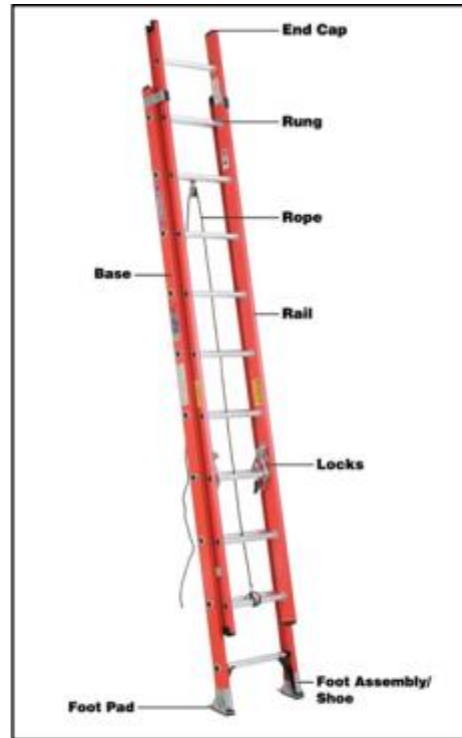


Fall Hazards – Ladders

Basic types of ladders:



Step Ladder



Extension Ladder

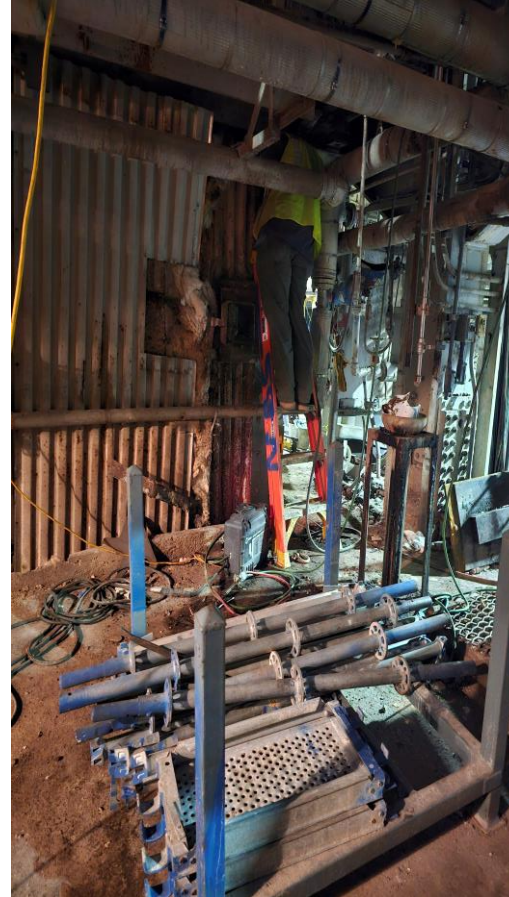


Fixed Ladder



Fall Hazards – Ladders

- One of the leading causes of fatalities and injuries.
- Ladder safety
 - Use the right ladder.
 - Use ladder that is free from defects.
 - Use the ladder properly.



Fall Hazards – Ladders



Fall Hazards - Ladders



Controlling Fall Hazards - Ladders



Use the right ladder:

- Use the right type, length, and rating for the job.
- Never use the top two steps of a step ladder.
- Obtain a longer ladder if needed.



Controlling Fall Hazards - Ladders



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Controlling Fall Hazards – Ladders



Free from defects

- Regardless of ladder type, inspect the ladder before use.
- Do not use the ladder if it is bent or there are missing parts.
- Remove defective ladders from service and rendered them unusable.



Controlling Fall Hazards - Ladders

Proper use

- Ladders must be used according to the manufacturer.
- Take the time to read the information.
- Read and follow all informational stickers and warning labels.



Controlling Fall Hazards - Ladders

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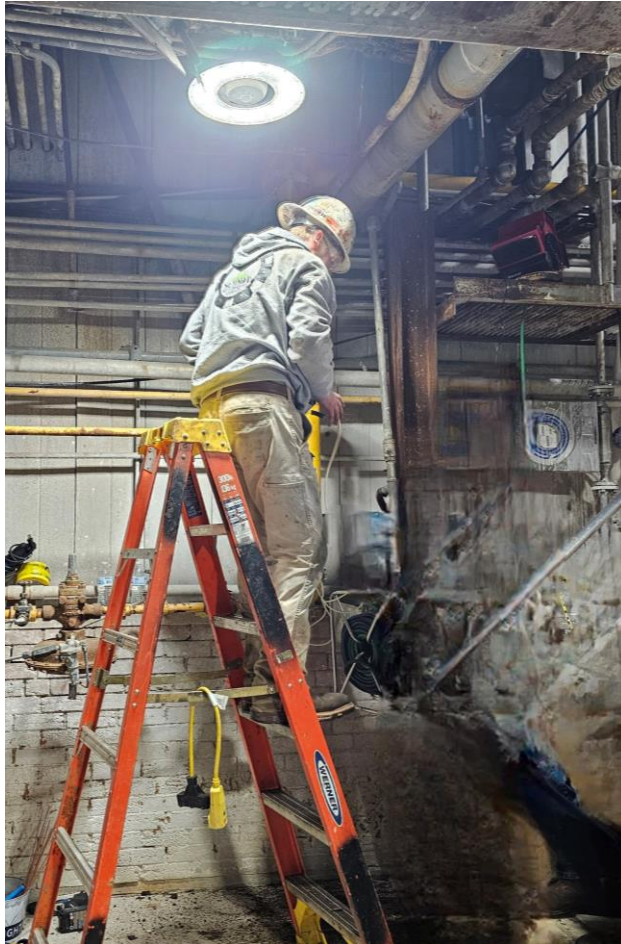
Controlling Fall Hazards - Ladders



**THREE POINTS
OF CONTACT**



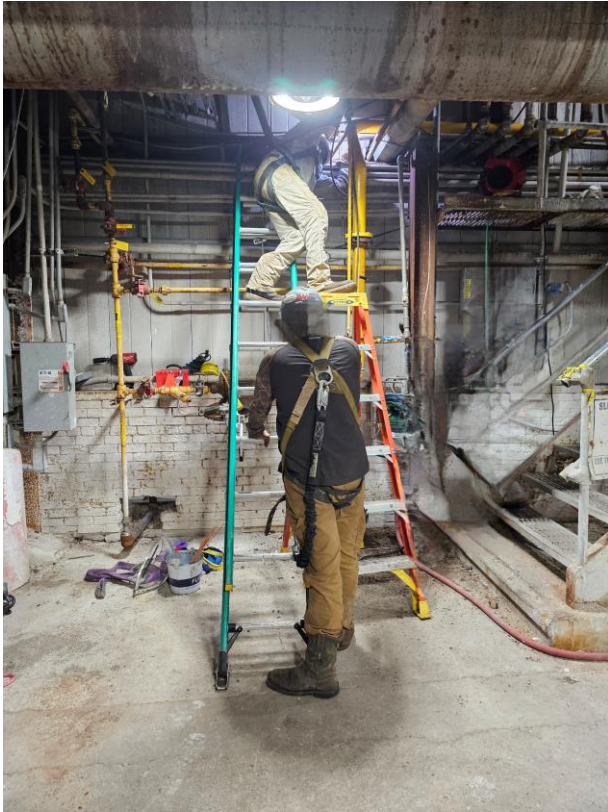
Controlling Fall Hazards – Ladders



- Maintain proper positioning.
- Do not lean away from the ladder to carry out your task.
- Always keep your weight centered between the side rails.
- Move the ladder as necessary.



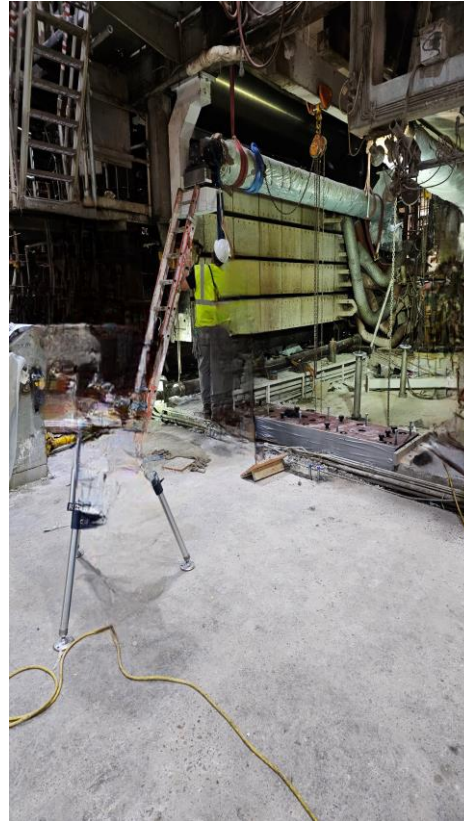
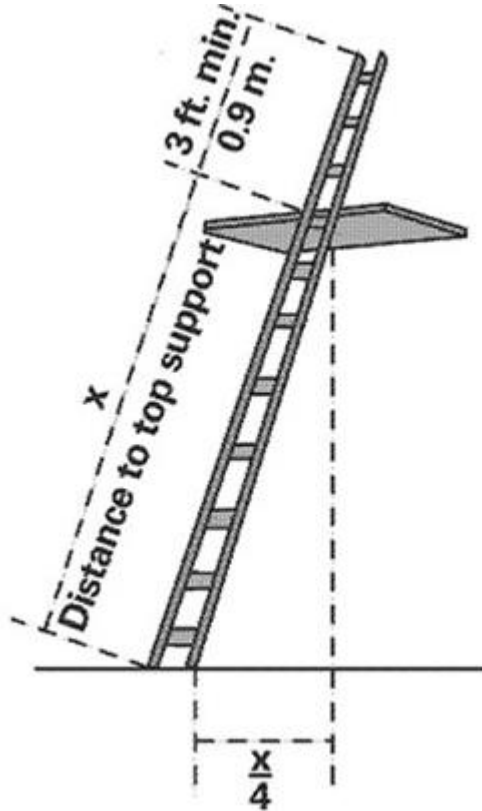
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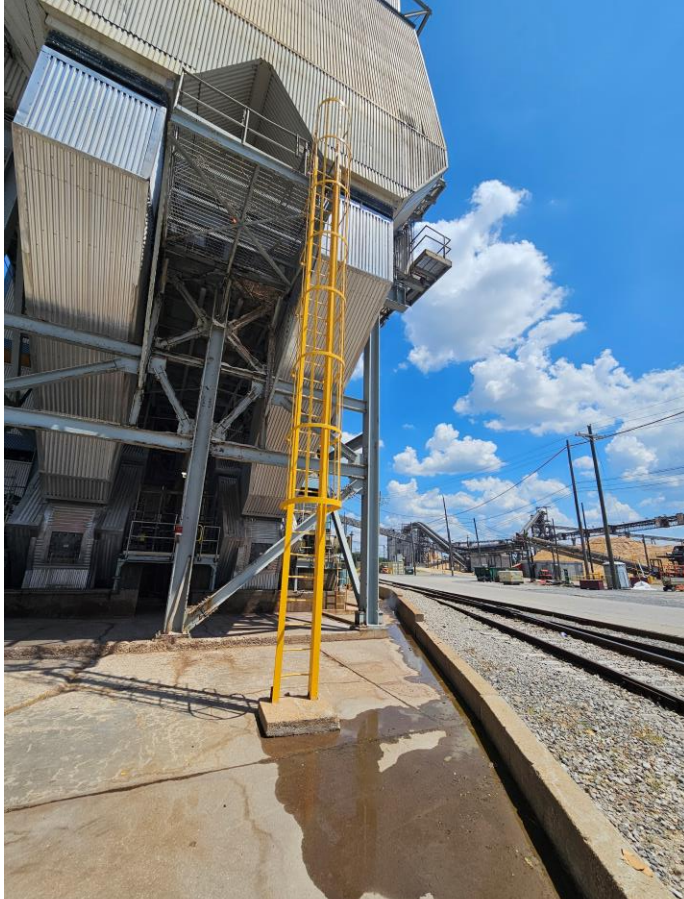
Controlling Fall Hazards - Ladders



- When using ladders to access another level, secure and extend the ladder at least 3 feet above the landing point.
- Angle ladder so the horizontal distance of bottom is $\frac{1}{4}$ the working length of the ladder.



Controlling Fall Hazards – Ladders



Fixed industrial ladders

- Must be equipped with a
 - Personal fall arrest system, ladder safety system, cage, or well (if installed before 11/19/2018)
 - Personal fall arrest system or ladder safety system (if installed on/after 11/19/2018)
 - On and after 11/18/2036, **all** fixed ladders are equipped with a personal fall arrest system or a ladder safety system.
- PFAS or ladder safety system must provide protection throughout entire vertical distance of ladder

Ladder safety system means a system designed to eliminate or reduce the possibility of falling from a ladder. A ladder safety system usually consists of a carrier, safety sleeve, lanyard, connectors, and body harness. Cages and wells are not ladder safety systems.



Controlling Fall Hazards - Ladders



Ship Stairs

- These are fixed ladders with an angle of 50 degrees to 70 degrees.
- These fixed ladders are to be ascended and descended facing the steps.



Controlling Fall Hazards – Ladders



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Controlling Fall Hazards - Ladders

Ladderway Floor Openings

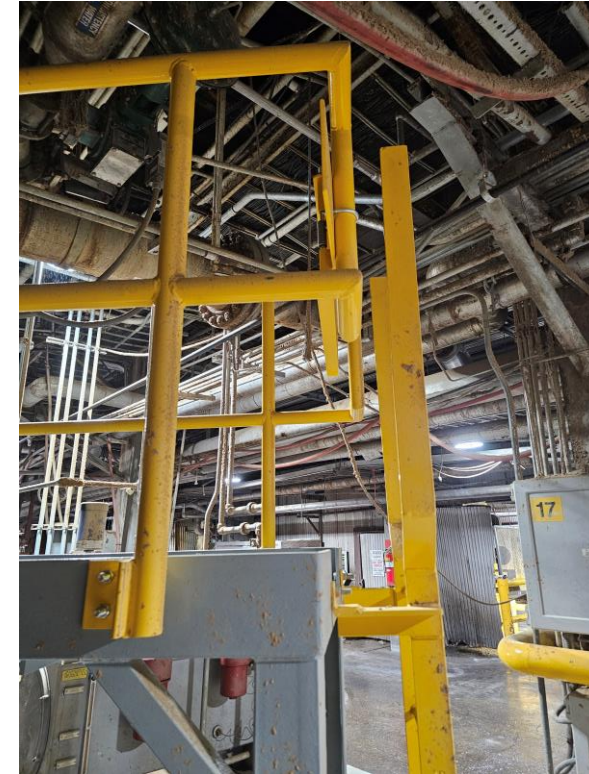
- Guard with a standard railing with toeboard on all exposed sides (except entrance).
- Guard the passage through the railing with a swinging gate or offset it to prevent someone from walking into the opening.



Controlling Fall Hazards - Ladders

Fixed Ladder Openings

- Self-closing gate
 - Equipped with a spring-loaded device
 - Automatically restores guardrail protection
- Offset passage
 - Offset railings
 - Prevents direct access to the ladder opening



Fall Hazards – Scaffolds



- Scaffold-related incidents can also lead to injury and death.
- Scaffold safety
 - free from defects
 - proper set-up
 - proper use



Controlling Fall Hazards – Scaffolds



- Building standards
- Tags
- Inspections



OK

This scaffold has been erected to meet Federal/State OSHA Standards and is safe for all craft work.

DO NOT ALTER

DATE: _____
COMPETENT PERSON: _____
SIGNATURE: _____
COMMENTS: _____

DATE	SIGNATURE

SEE OTHER SIDE



Fall Hazards – Scissor Lifts

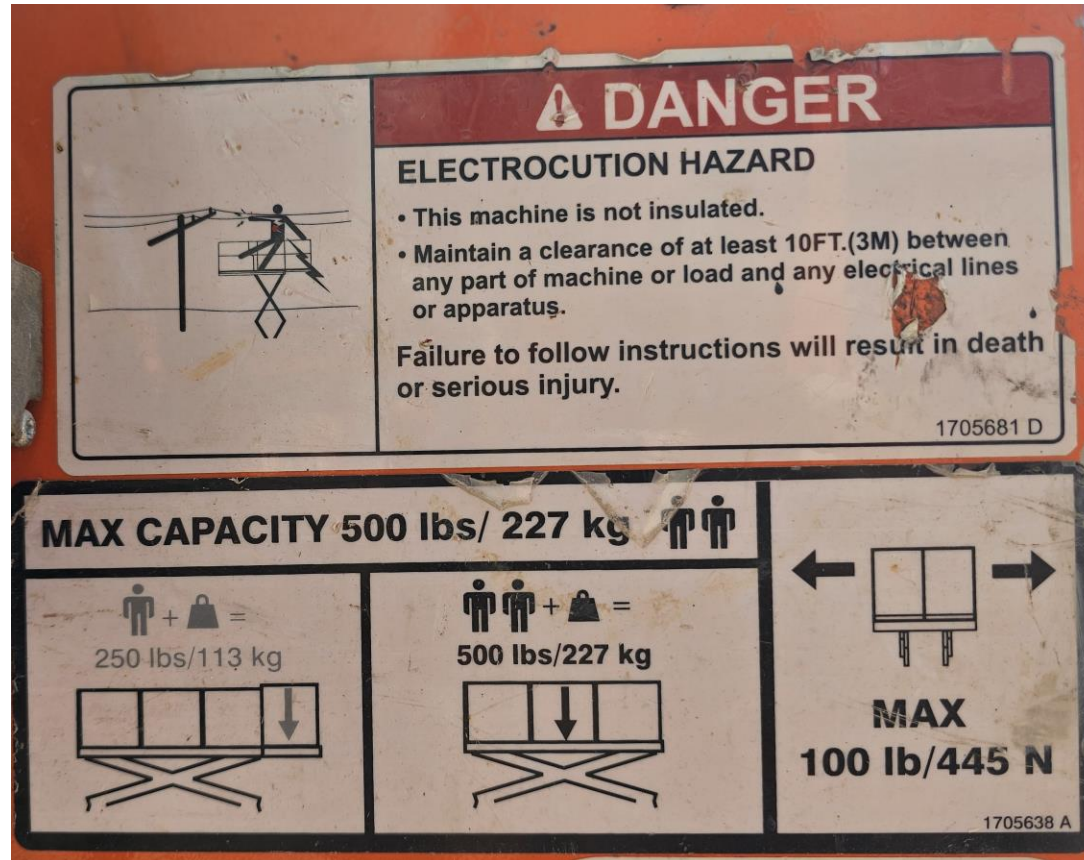


OSHA's investigations found that most injuries and fatalities involving scissor lifts were the result of employers not addressing:

- Fall Protection
- Stabilization
- Positioning



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- Fall Protection
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- Positioning



Controlling Fall Hazards – Scissor Lifts



Fall protection

- Check to see that a guardrail system is in place before working on the scissor lift.
- Only stand on the work platform; never stand on the guardrails.
- Keep work within easy reach to avoid leaning away from the scissor lift.

Note: Some manufacturers require a PFAS in addition to the unit's guardrails.



Fall Hazards – Stairs



- Often stair-related hazards can be overlooked.
- Stair safety comes down to proper
 - Design & Construction
 - Condition
 - Use

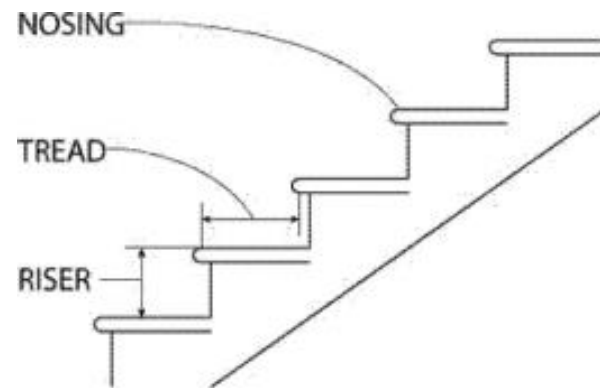


Controlling Fall Hazards - Stairs



Proper design/construction

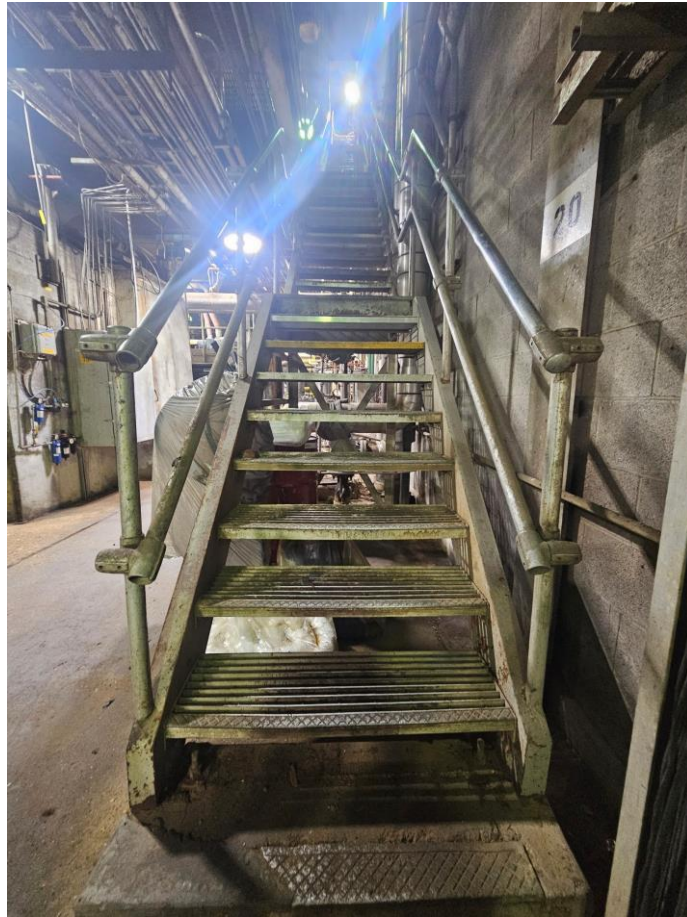
- Fixed industrial stairs must be:
 - strong enough to handle a minimum 1,000 lb. live load;
 - at least 22 inches wide;
 - installed at angles between 30-50 degrees; and
 - no more than ¼ inch variation.



MINIMUM TREAD WIDTH 22 IN (56 CM)
MINIMUM TREAD DEPTH 9.5 IN (24 CM)
MAXIMUM RISER HEIGHT 9.5 IN (24 CM)



Controlling Fall Hazards - Stairs



Proper design/construction

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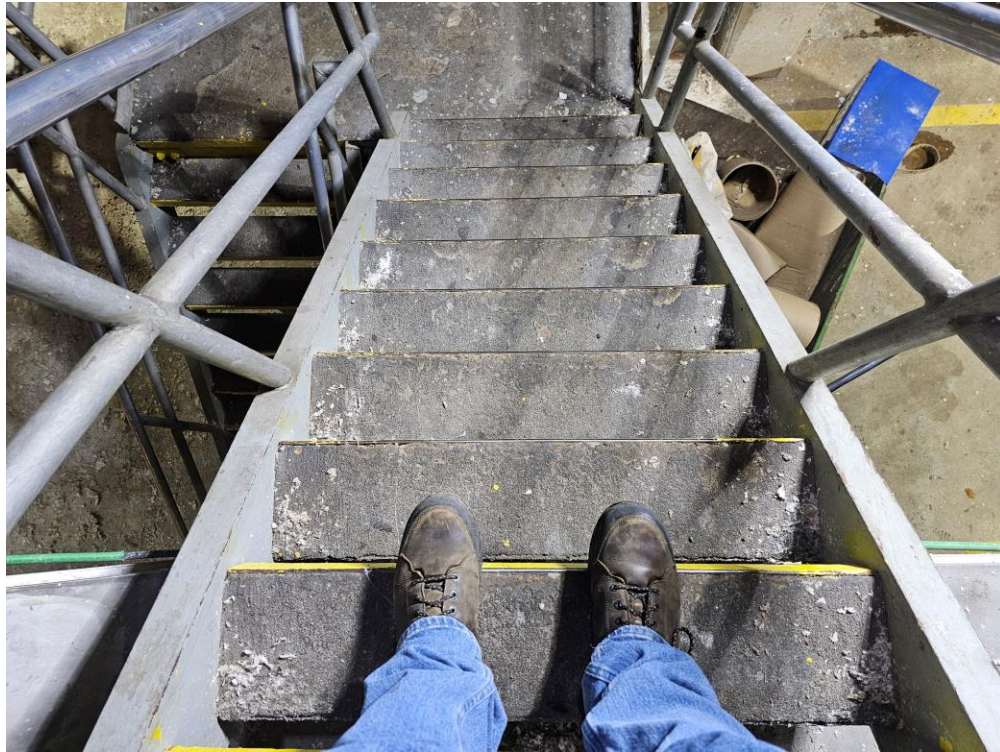
Controlling Fall Hazards – Stairs



Angle to horizontal	Rise (in inches)	Tread run (in inches)
30 deg. 35'	6 ½	11
32 deg. 08'	6 ¾	10 ¾
33 deg. 41'	7	10 ½
35 deg. 16'	7 ¼	10 ¼
36 deg. 52'	7 ½	10
38 deg. 29'	7 ¾	9 ¾
40 deg. 08'	8	9 ½
41 deg. 44'	8 ¼	9 ¼
43 deg. 22'	8 ½	9
45 deg. 00'	8 ¾	8 ¾
46 deg. 38'	9	8 ½
48 deg. 16'	9 ¼	8 ¼
49 deg. 54'	9 ½	8



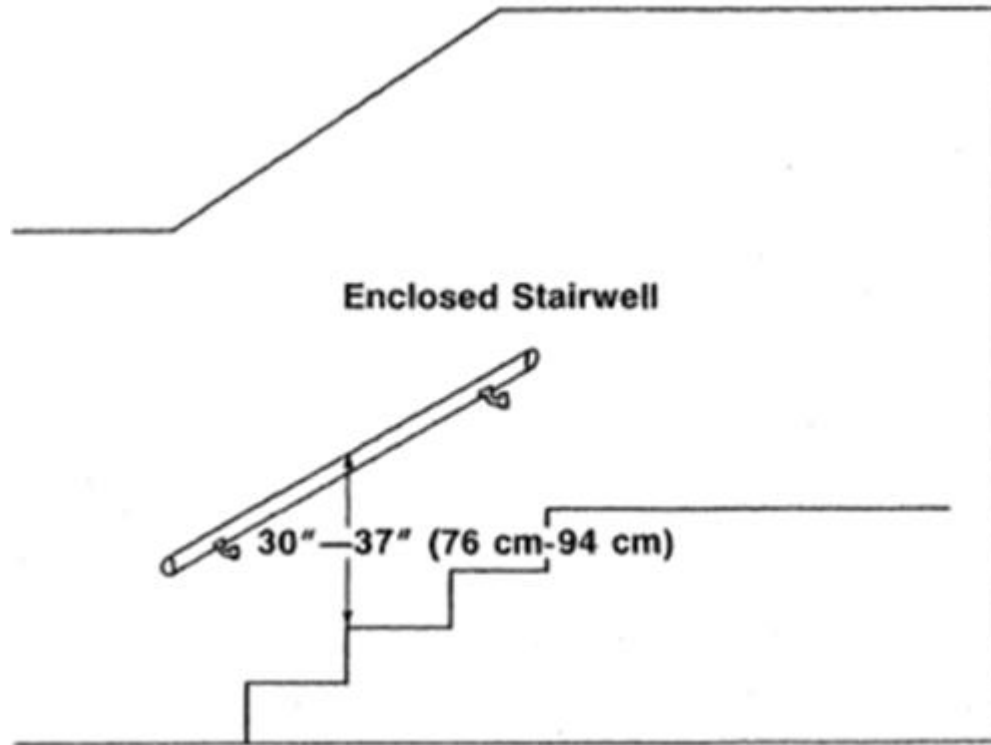
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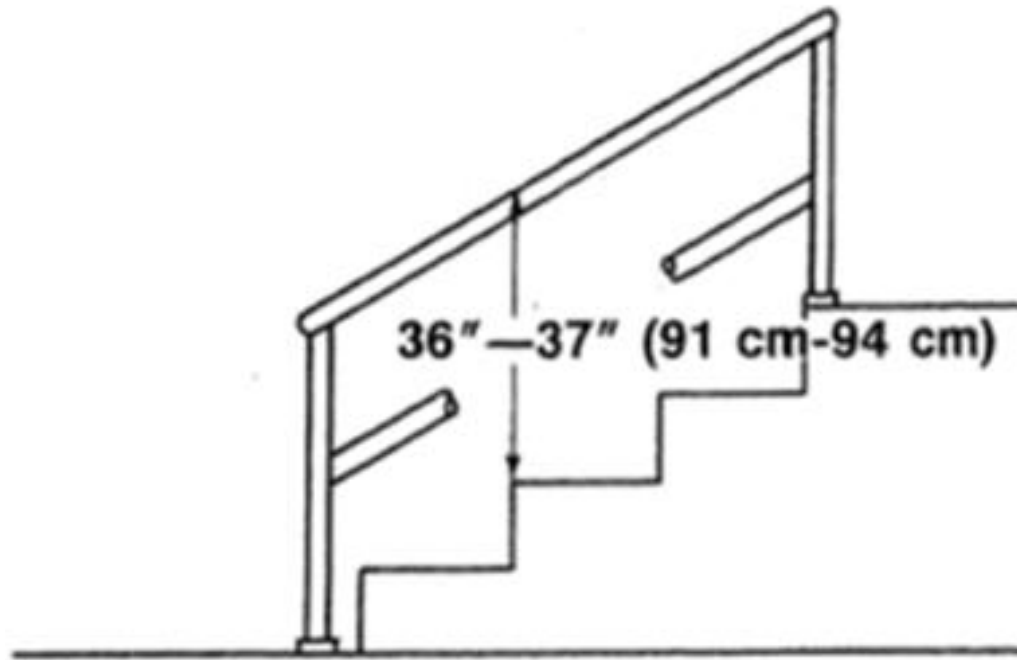
Controlling Fall Hazards - Stairs



- Handrails are required when there is 4 or more risers.
- Mainly to be used on the right side as you descend.
- Allows you to maintain three points of contact.



Controlling Fall Hazards - Stairs



- Stair rails prevent falls from open sides.
- Stair rail system must be present on the unprotected sides and edges (open stairs).
- Stair rails are required when there is 4 or more risers.



Controlling Fall Hazards – Stairs

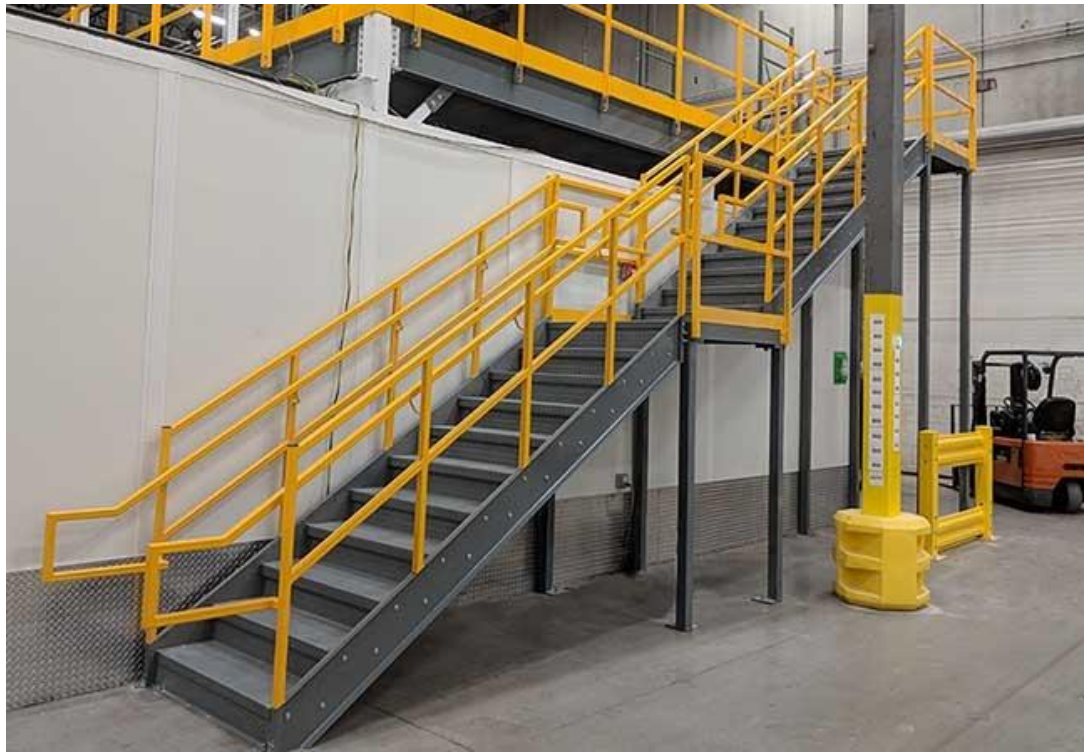


Condition

- Fixed industrial stairs must be maintained in good shape.
- These stairs are uneven and unpredictable.
- Report stair-related defects.



Controlling Fall Hazards – Stairs



Proper use

- Maintain at least three (3) points of contact.
- Do not run up or down stairs.
- Do not carry heavy objects, only light loads.
- Do not jump the last few steps.



Controlling Fall Hazards – Stairs



- Items should never be placed or stored on stairs.
- Stairs should be inspected on a regular basis.
- Remove items to ensure no one gets hurt.



Common Fall Hazards

Common fall hazards:

- Floor and wall openings
- Open-sided platforms and runways



Fall Hazards – Floor Openings



Controlling Fall Hazards – Floor Openings



- Unguarded openings like this must never exist.
- They require a proper cover or guardrail system at all times.
- Posting a person to monitor an opening like this for temporary access is permitted.
- Hard barricaded if unattended.



Controlling Fall Hazards – Floor Openings



- Unguarded openings like this must never exist.
- They require a proper cover or guardrail system at all times.
- Posting a person to monitor an opening like this for temporary access is permitted.
- Hard barricaded if unattended.



Controlling Fall Hazards – Floor Openings



Controlling Fall Hazards - Floor Openings



Controlling Fall Hazards - Floor Openings



Controlling Fall Hazards – Wall Openings



- Wall openings from which there is a drop of more than 4 feet must be guarded.
- They require a proper guardrail system at all times.



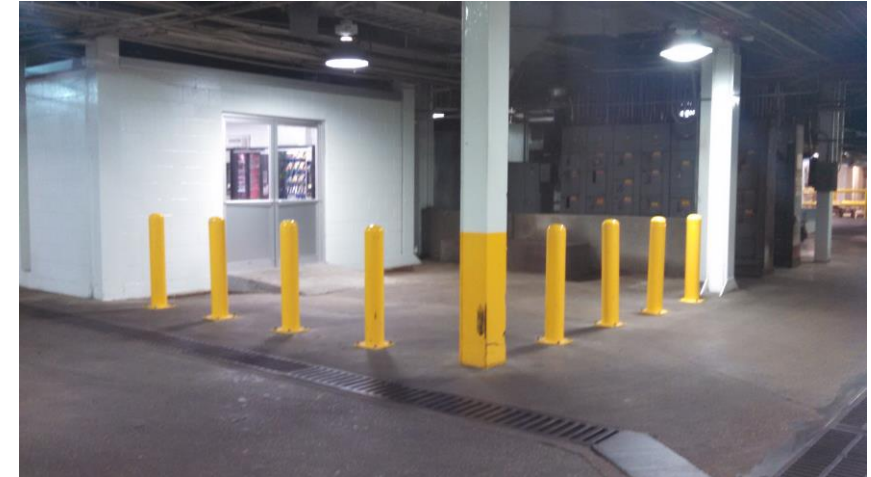
Guardrail Systems



- **Standard railing:** consists of top rail, mid-rail, and posts. Height from the upper surface of top rail to floor level is 42" (+/- 3"). Mid-rail height is 21 inches.
- **Standard toeboard:** 3.5" high, with not more than 1/4" clearance above the floor.



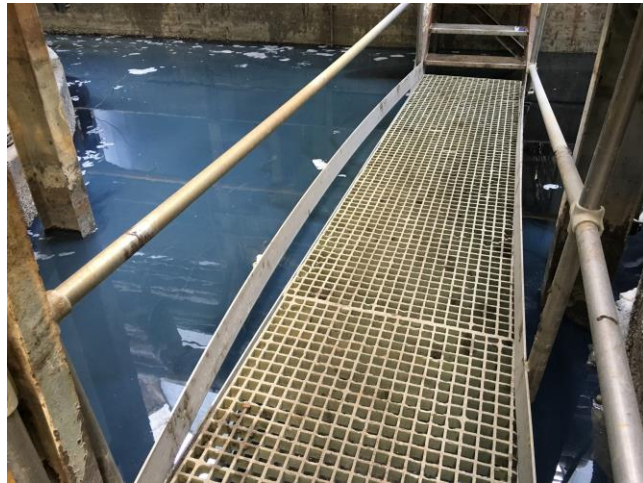
Controlling Hazards – Pedestrian WWS



WWS Hazards



WWS Hazards



WWS Hazards



WWS Hazards



WWS Hazards



WWS Hazards



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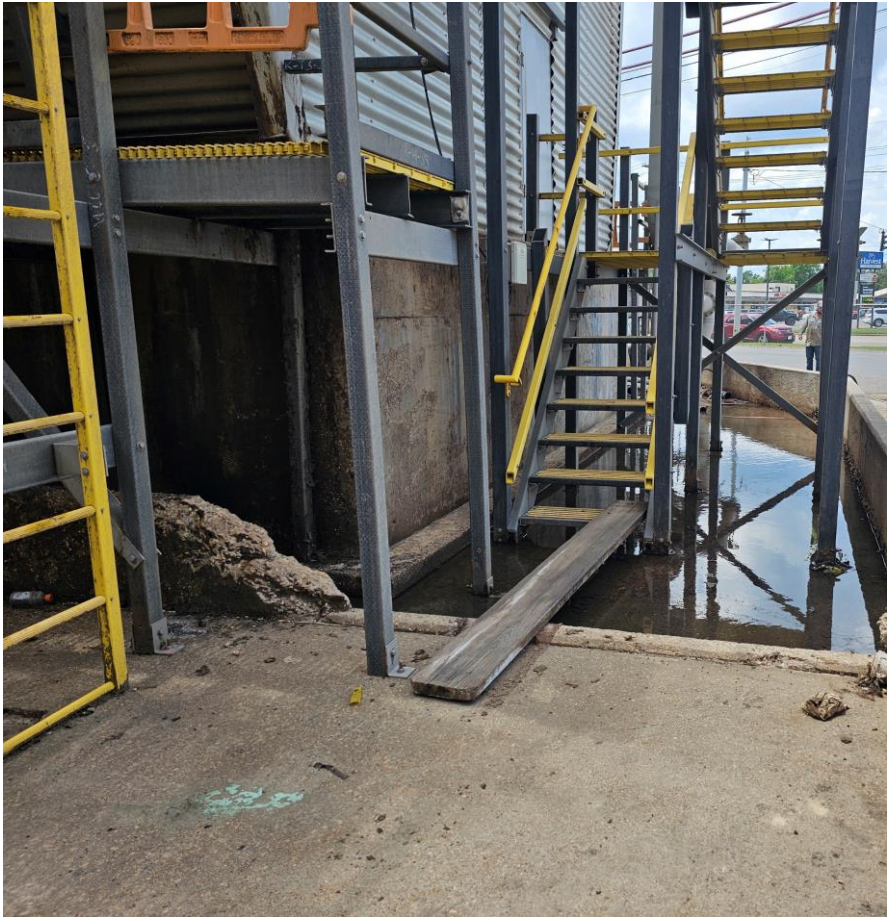
WWS Hazards



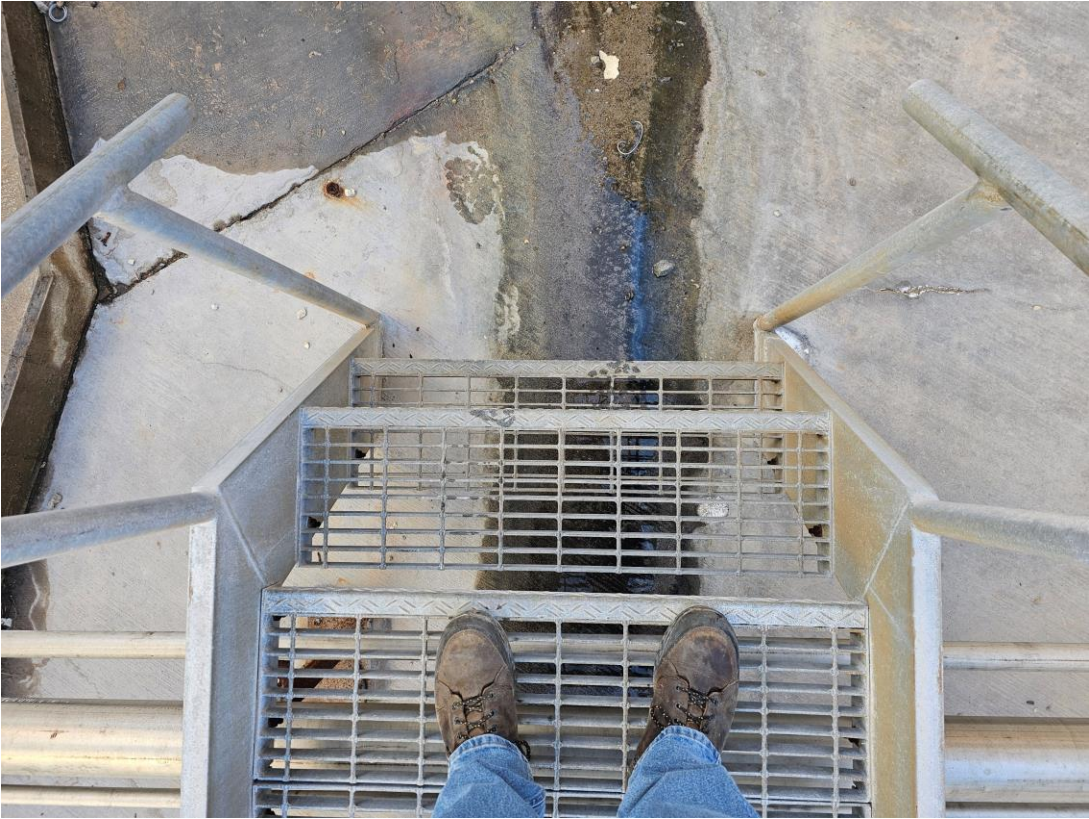
WWS Hazards



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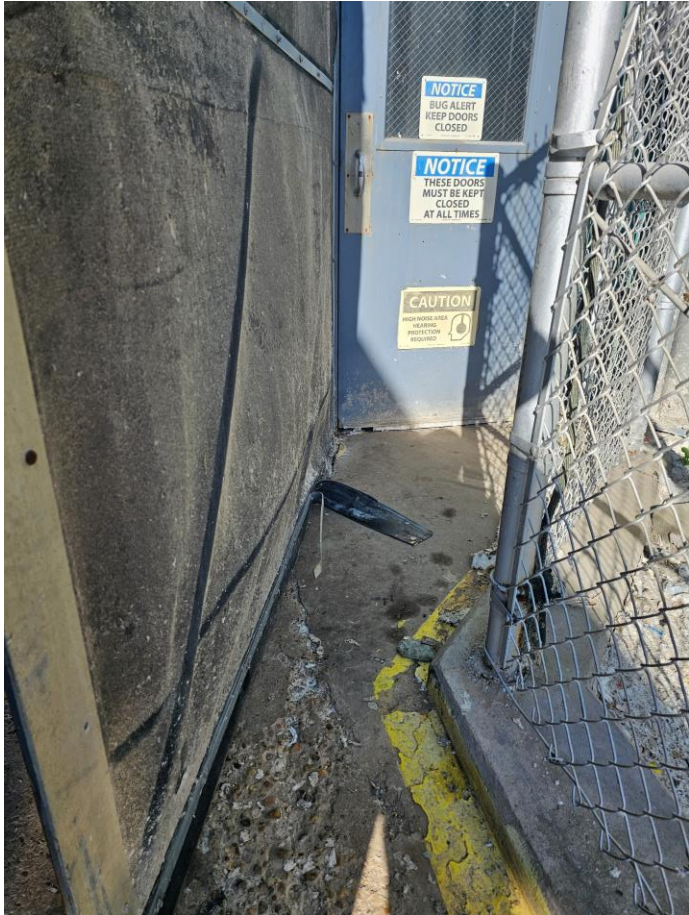
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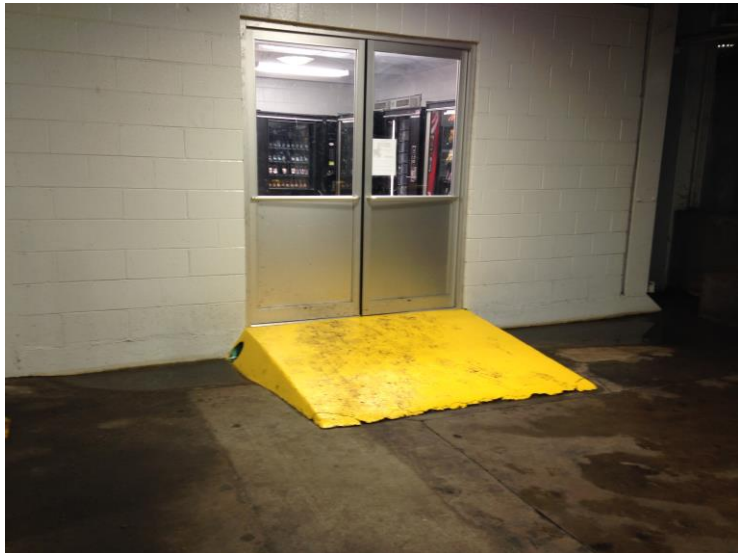
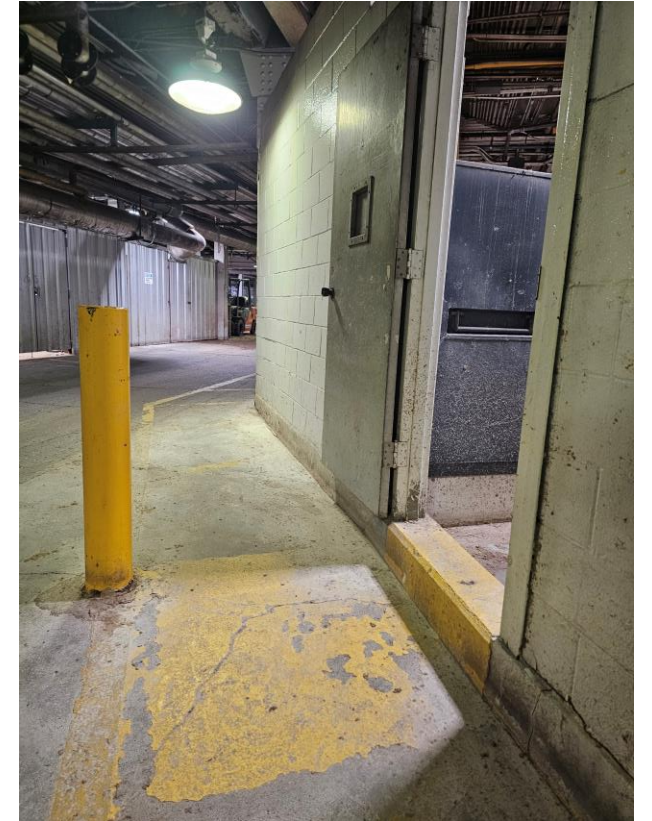
WWS Hazards



WWS Hazards



Best Practices



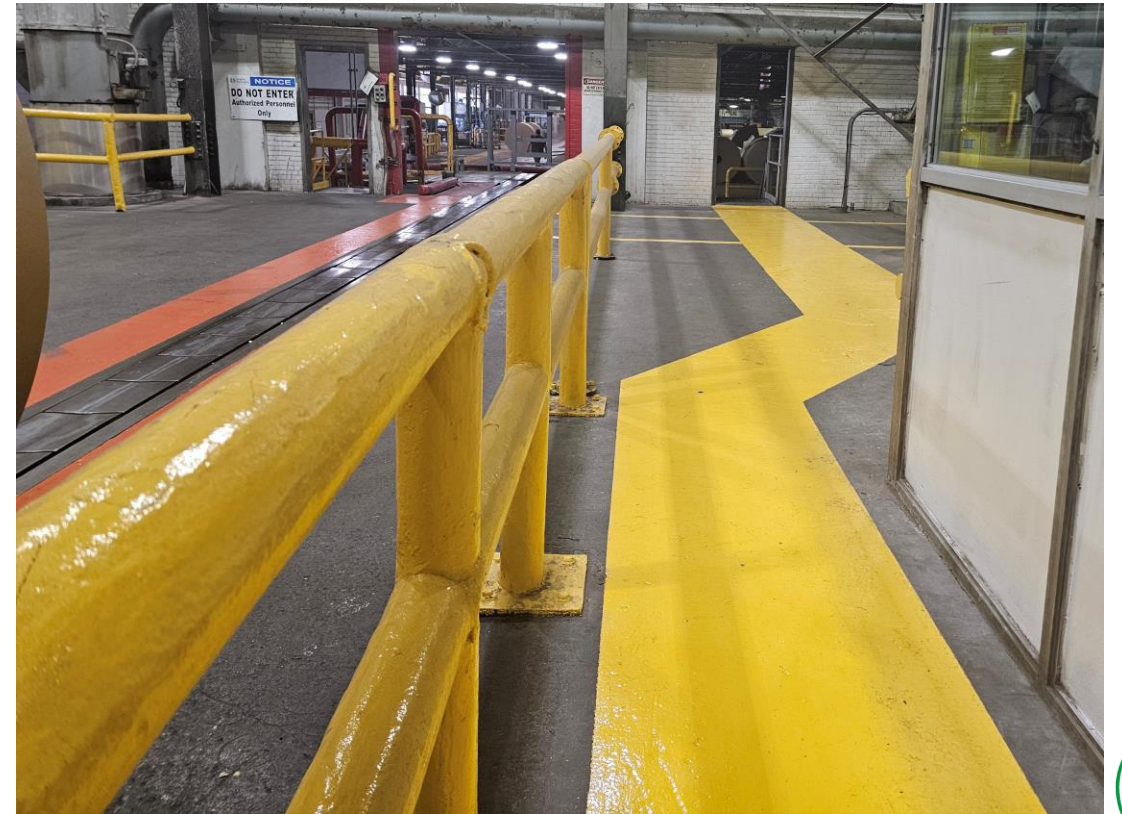
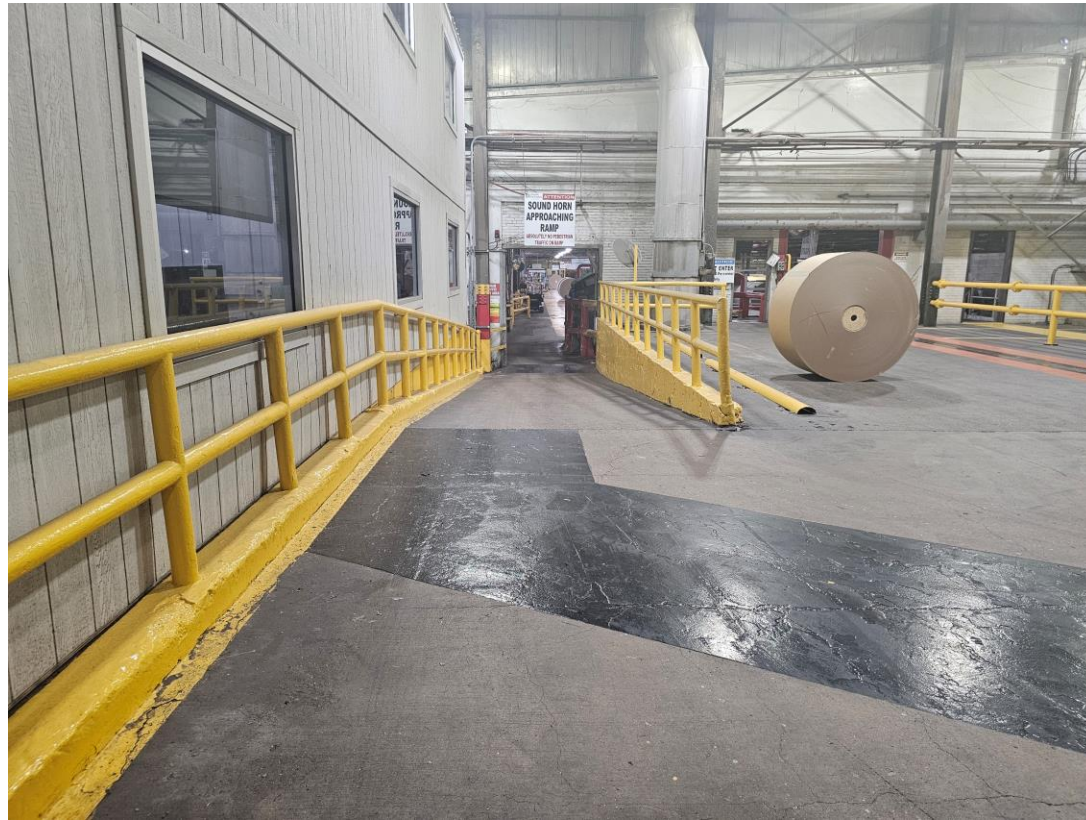
Best Practices



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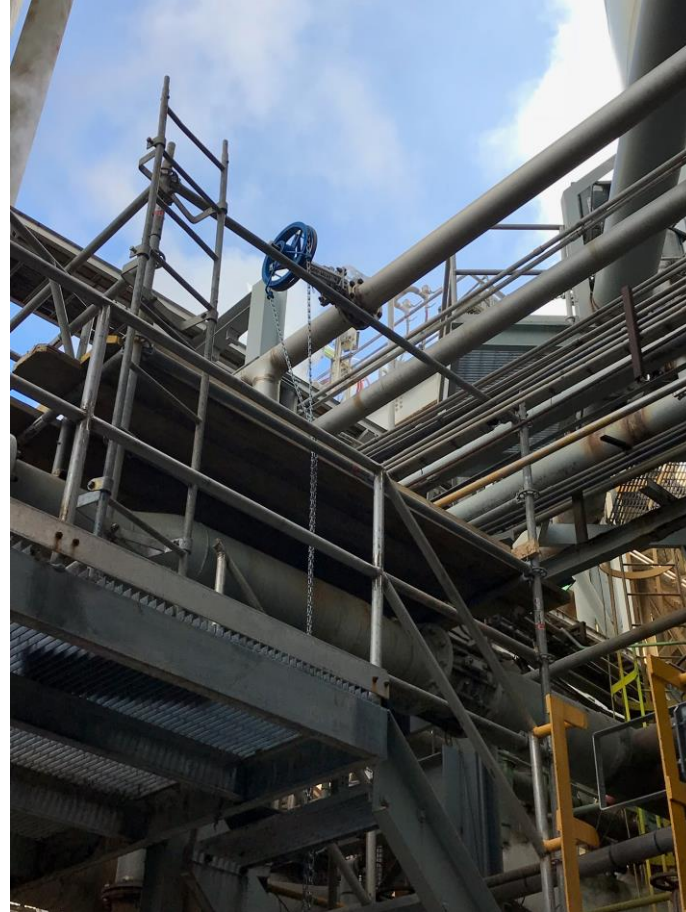
Best Practices



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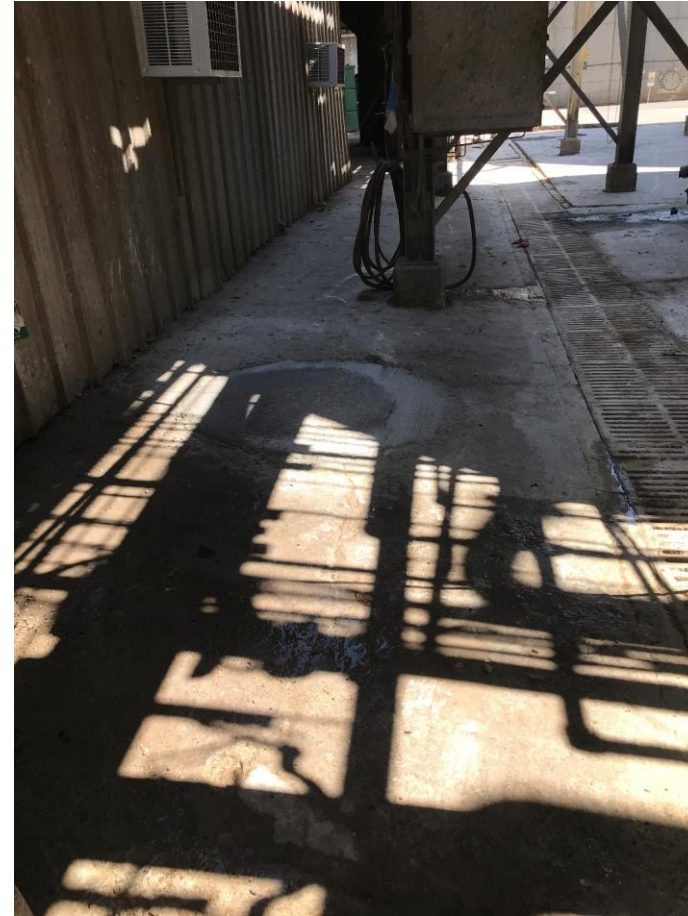
Best Practices



Best Practices



Best Practices



Best Practices



Best Practices



Best Practices – Engineering

Platform and Stairs Design Guide

General Design Guide for Platforms and Accessways

- Performance Requirements
- Structural Materials
- Bolts and Connectors
- Miscellaneous Materials
- Fabrication
- Galvanizing

General Design Guide for Metal Grating Stairs, Stair Landings, Handrails and Guardrails

- Performance Requirements
- Metals
- Fasteners
- Miscellaneous Materials
- Fabrication, General
- Fabrication of Steel-Framed Stairs
- Finishes

Execution

- Installing Metal Platforms
- Installing Metal Stairs
- Installing Railings

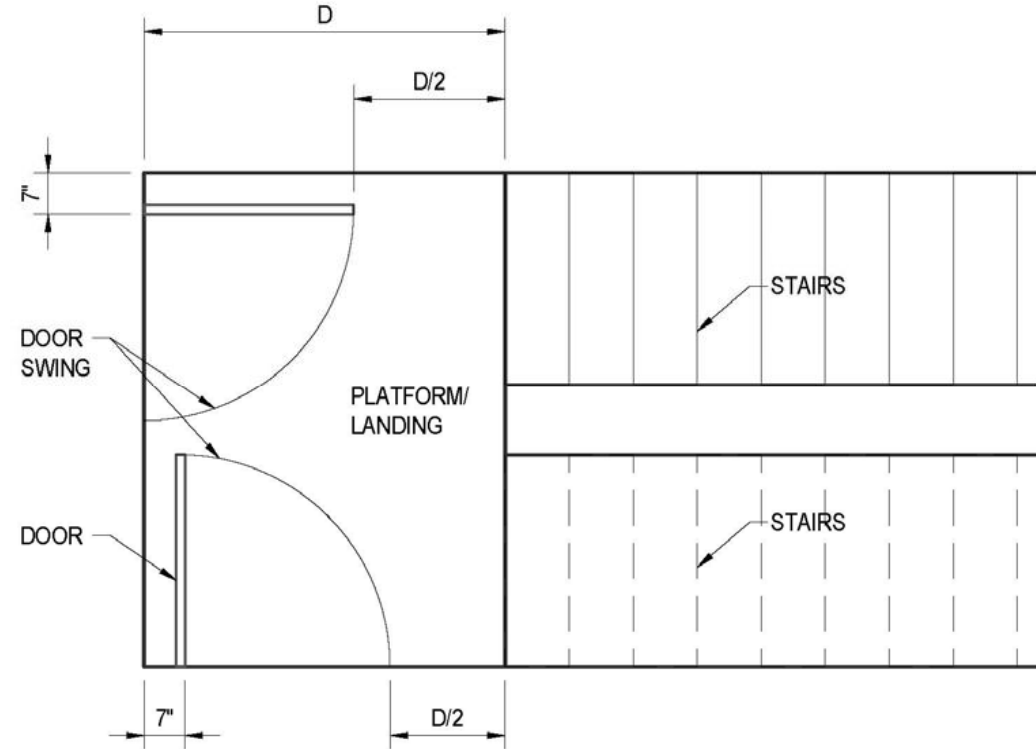
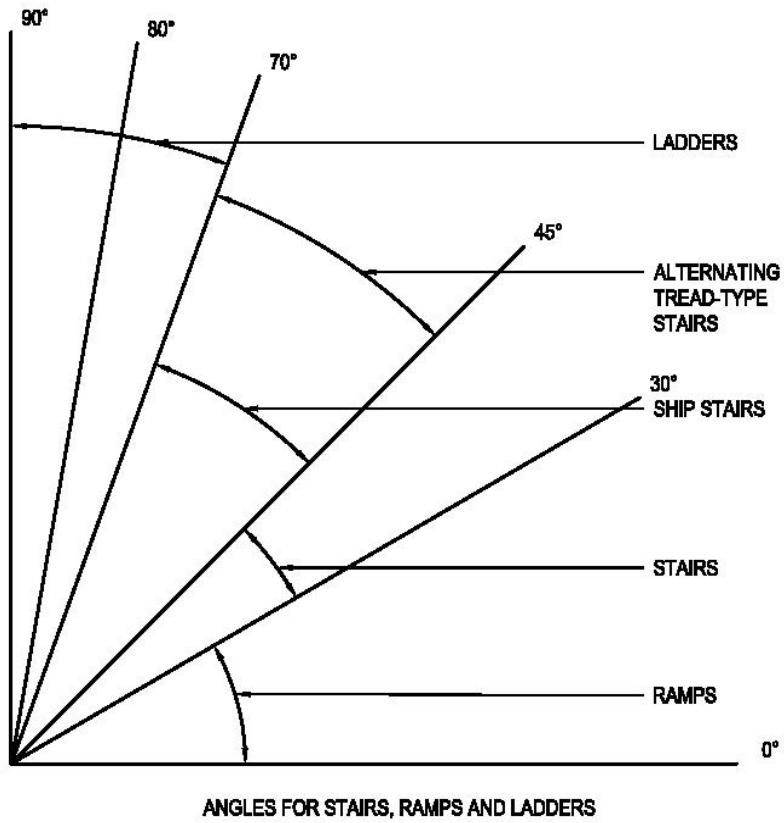
Typical Details

- Angles for Stairs, Ramps and Ladders
- Stairway Rise and Tread Dimensions
- Stairway Riser and Tread Max/Min
- Minimum Landing
- Typical Handrail Detail
- Typical Handrail Posts Heights
- Typical Caged Ladder Construction



Best Practices - Engineering

Platform and Stairs Design Guide



Best Practices

Composite Grating and Resin Selection

- FRP grating is generally used in high corrosive areas, wastewater areas, and slippery areas.
- FRP grating will only be used in approved areas set forth by engineering, reliability, or area management.
- When selecting resin-based grating, the following should be considered:
 - corrosive agents to which grating will be exposed
 - concentration of the corrosives to which grating will be exposed
 - temperature of the corrosives that will contact the grating
 - application of the corrosives:
 - frequent exposures that will be cleaned up
 - frequent exposures not immediately cleaned up
 - continuous exposure (submersed)



Infrequent exposure



Exposure not compatible with resins



Frequent exposure not immediately cleaned up

Source: ANSI/ACMA FRP Composites Grating Manual FG01-17



Best Practices – Engineering

Resin Selection Guide				
<i>Resin Type</i>	<i>Resin Base</i>	<i>Description</i>	<i>Corrosion Resistance</i>	<i>Max. Temp</i>
V	Vinyl Ester	Superior corrosion resistance and fire retardant	Excellent	200 F
I	Isophthalic Polyester	Industrial grade corrosion resistance and fire retardant	Very good	150 F
F	Isophthalic Polyester	Food grade corrosion resistance and fire retardant	Very good	150 F
GP	General Purpose	Moderate corrosion resistance and fire retardant	Moderate	150 F
XFR	Isophthalic Polyester	Extra fire retardant and moderate corrosion resistance	Moderate	150 F
P	Phenolic	Low smoke and superior fire resistance	Very good	300 F

Source: ANSI/ACMA FRP Composites Grating Manual FG01-17



Best Practices – Auditing

Walking Working Surfaces Audit Form

Name	Date	Department
------	------	------------

... the employer must ensure each employee on a walking-working surface 4 feet or more above a lower level is protected from falling

Surface Conditions

- All places of employment, passageways, storerooms, service rooms, and walking-working surfaces are to be kept in a clean, orderly and sanitary condition.
- The floor of each workroom is to be maintained in a clean and, to the extent feasible, in a dry condition. When wet processes are used, drainage must be maintained and, to the extent feasible, dry standing places, such as false floors, platforms and mats must be provided.
- Walking-working surfaces are to be maintained free of hazards such as sharp or protruding objects, loose boards, corrosion, leaks, spills, snow and ice.

Ladders

- Ladder rungs, steps, and cleats have to be parallel, level and uniformly spaced when the ladder is in position for use.
- Ladder rungs, steps and cleats have to be spaced not less than 10 inches and not more than 14 inches apart, as measured between the centerlines of the rungs, cleats and steps.
- Ladder rungs, steps and cleats have to be a minimum clear width of 11.5 inches on portable ladders.
- Ladder rungs, steps and cleats have a minimum clear width of 16 inches for fixed ladders.

Portable Ladders

- Have to have at least 11.5 inches interior width between side rails.
- Extension ladders have to extend 3 feet above landing surface.
- Only UL approved non-conductive ladders in good condition and properly equipped with safety feet are allowed on the mill site.
- Wooden ladders are not allowed on the mill site.
- Stepladders have to be used fully open spreaders.
- Do not load ladder beyond the maximum intended load.
- The cap and top step of a stepladder are not used as steps.

Fixed Ladders

- Have to have at least 7 inches from the cleat forward for foot clearance.
- Have to have at least 2 feet 6 inches from the ladder backwards for body clearance.
- Side rails above platform have to flare out.
- Have to have at least 16 inches interior width between side rails.
- Need 15 inch clearance from center of cleat out (both directions).
- Step across distance from cleat to landing platform must be between 7 and 12 inches.
- Fixed ladders over 50 degrees have to be identified for ascending and descending facing forward – see *ship ladders*.

Mobile Ladder Stand Platform

- Store bought; not mill made.
- Steps have to be uniformly spaced and arranged, with a rise of not more than 10 inches and a depth of not less than 7 inches.
- The slope of the step stringer to which the steps are attached must not be more than 60 degrees, measured from the horizontal.
- Mobile ladder stand platforms with a platform height of 4 to 10 feet have to have, in the platform area, handrails with a vertical height of at least 36 inches and midrails (no toeboard required).
- All ladder stand platforms with a platform height above 10 feet have to have handrails, midrails and toeboards on the exposed sides and ends of the platform.
- Mobile ladder stand platforms have to have a step width of at least 16 inches.
- The steps and platforms of mobile ladder stand platforms have to be slip resistant.
- Mobile ladder stand platforms with a top step height of 4 feet or above have to have handrails (along stairs) with a vertical height of 29.5 inches to 37 inches, measured from the front edge of a step.

Stairways

- Vertical clearance above any stair tread to any overhead obstruction is to be at least 6 feet 8 inches, as measured from the leading edge of the tread.

- Stairs have to have uniform riser heights and tread depths between landings.
- Stairway landings and platforms are to be at least the width of the stair and at least 30 inches in depth, as measured in the direction of travel.

Stair width	Enclosed	One open side	Two open sides	With earth built up on both sides
Less than 44 inches (1.1 m)	At least one handrail	One stair rail system with handrail on open side	One stair rail system with handrail on each open side	
44 inches (1.1 m) to 60 inches (2.2 m)	One handrail on each enclosed side	One stair rail system with handrail on open side and one handrail on enclosed side	One stair rail system with handrail on each open side	
Greater than 60 inches (2.2 m)	One handrail on each enclosed side and one intermediate handrail located in the middle of the stair	One stair rail system with handrail on open side, one handrail on enclosed side, and one intermediate handrail located in the middle of the stair	One stair rail system with handrail on each open side and one intermediate handrail located in the middle of the stair	
Exterior stairs less than 44 inches (1.1 m)			One handrail on at least one side	

Note to table: The width of the stair must be clear of all obstructions except handrails.

- When a door or a gate opens directly on a stairway, a platform is to be provided, and the swing of the door or gate cannot reduce the platform's effective usable depth to:
 - less than 20 inches for platforms installed before January 17, 2017.
 - less than 22 inches for platforms installed on or after January 17, 2017.

Standard Stairs

- Are to be installed at angles between 30 to 50 degrees from the horizontal.
- Have a maximum riser height of 9.5 inches.
- Have a minimum tread depth of 9.5 inches.
- Have a minimum width of 22 inches between vertical barriers.

Spiral Stairs

- Only allowed around tanks and similar round structures when the diameter of the tank or structure is at least 5 feet.
- Have a minimum clear width of 26 inches.
- Have a maximum riser height of 9.5 inches.

- Have a minimum headroom above spiral stair treads of at least 6 feet 6 inches, measured from the leading edge of the tread.
- Have a minimum tread depth of 7.5 inches, measured at a point 12 inches from the narrower edge.
- Have a uniform tread size.

Ship Ladders – Avoid Installing

- Are installed at a slope of 50 to 70 degrees from the horizontal.
- Have open risers with a vertical rise between tread surfaces of 6.5 to 12 inches.
- Have minimum tread depth of 4 inches.
- Have a minimum tread width of 18 inches.

Steps over 60 degrees are Ladders

- Labeled as to ascend and descend facing steps.
- Inspected each shift prior to use.

Dock boards

- Secured by anchoring them in place or using equipment or devices that prevent the dockboard from moving out of a safe position.
- Wheel chocks or sand shoes are to be used to prevent the transport vehicle on which a dockboard is placed from moving while employees are on the dockboard.

Scaffolding

- Tags
 - Scaffold builder will communicate issues on the tags to the hiring party prior to putting the scaffold in service.
 - If we have any questions or concerns about a scaffold, take a picture of scaffold issue and contact scaffolding erector.

Inspections

- Scaffolding will be inspected daily and indicated on the tag.
- If inspection tag is missing or not current, scaffolding is not to be used.

Building Standards

- Scaffold ladders will not have equipment, piping, etc. running through the ladder.



Best Practices – Auditing

- Scaffold ladders should turn into the platform.
- Scaffold platforms will be fully decked, hand railed, mid railed and toe boards.
- Scaffolding platforms should have self-closing gates when practical.
- If the transition from ladder to scaffold platform will be difficult, additional access platforms will be built to make a smoother transitions.
- Any scaffold that has a difficult transition from ladder to platform – builder will notify the requesting party and will install their component that allows for self-retractable lanyard and GPI will install the self-retractable lanyard with rope attached to it. Requesting party is responsible to inform the crew using the scaffolding.
- If scaffolding cannot meet these standards; builder will inform the requesting party and indicate such on the tag. Requesting party is responsible to inform the crew using the scaffolding.

Protection From Fall Hazards

An employee on a walking-working surface with an unprotected side or edge that is 4 feet or more above a lower level is to be protected from falling:

- unprotected side or edge
- loading rack, loading dock
- hoist areas
- holes
- stairway floor opening
- ladderway floor hole
- ladderway platform
- hatchway and chute-floor opening
- dockboards
- catwalks
- opening chute attachment
- repair pits, service pits

24 feet - Each fixed ladder installed before November 19, 2018 is to be equipped with a personal fall arrest system, ladder safety system, cage or well.

24 feet - Each fixed ladder installed on and after November 19, 2018 is to be equipped with a personal fall arrest system or a ladder safety system.

Fixed ladders having a cage must have a landing platform provided at maximum intervals of 50 feet.

Stairways

- An unprotected side or edge of a stairway landing that is 4 feet or more above a lower level is to be protected by a guardrail or stair rail system.

- Each flight of stairs having at least 3 treads and at least 4 risers is to be equipped with stair rail systems and handrails.
- Each ship ladders (50 to 70 degree stairs) and alternating tread type stairs is to be equipped with handrails on both sides.

Work On Low Slope Roofs

Contact Safety Department.

Falling Object Protection

- When an employee is exposed to falling objects, the employer must ensure that each employee wears head protection.
- In addition, the employer must protect employees from falling objects by implementing one or more of the following:
 - erecting toeboards, screens or guardrail systems to prevent objects from falling to a lower level;
 - erecting canopy structures and keeping potential falling objects far enough from an edge, hole or opening to prevent them from falling to a lower level; or
 - barricading the area into which objects could fall, prohibiting employees from entering the barricaded area and keeping objects far enough from an edge or opening to prevent them from falling to a lower level.

Criteria and Practices

Guardrail Systems

- The top edge height of top rails, or equivalent guardrail system members, are 42 inches (plus or minus 3 inches) above the walking-working surface.
- Midrails are installed between the walking-working surface and the top edge of the guardrail system when there is not a wall or parapet that is at least 21 inches high.
- Midrails are installed at a height midway between the top edge of the guardrail system and the walking-working surface.
- Guardrail systems are smooth-surfaced to protect employees from injury, such as punctures or lacerations, and to prevent catching or snagging of clothing.
- The ends of top rails and midrails do not overhang the terminal posts, except where the overhang does not pose a projection hazard for employees.
- Top rails and midrails are at least 0.25-inches in diameter or in thickness.
- Guardrail systems on ramps and runways are installed along each unprotected side or edge.

Each cover for a hole in a walking-working surface is secured to prevent accidental displacement.

Handrails and Stair Rail Systems

- Handrails are not less than 30 inches and not more than 38 inches, as measured from the leading edge of the stair tread to the top surface of the handrail.
- The height of stair rail systems installed before January 17, 2017 is not less than 30 inches from the leading edge of the stair tread to the top surface of the top rail.
- The height of stair rail systems installed on or after January 17, 2017 is not less than 42 inches from the leading edge of the stair tread to the top surface of the top rail.
- The minimum clearance between handrails and any other object is 2.25 inches.
- Handrails and stair rail systems are smooth-surfaced to protect employees.
- Handrails have the shape and dimension necessary so that employees can grasp the handrail firmly.
- The ends of handrails and stair rail systems do not present any projection hazards.

Handrail means a rail used to provide employees with a handhold for support.

Stair rail or stair rail system means a barrier erected along the exposed or open side of stairways to prevent employees from falling to a lower level.

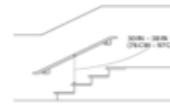


Figure D-12 - Standard Handrail



Toeboards

- Have a minimum vertical height of 3.5 inches as measured from the top edge of the toeboard to the level of the walking-working surface.
- Do not have more than a 0.25-inch clearance or opening above the walking-working surface.
- Are solid or do not have any opening that exceeds 1 inch at its greatest dimension.
- Where tools, equipment or materials are piled higher than the top of the toeboard, paneling or screening is installed from the toeboard to the midrail of the guardrail system and for a length that is sufficient to protect employees below.
- If the items are piled higher than the midrail, the employer also must install paneling or screening to the

top rail and for a length that is sufficient to protect employees below.

- All openings in guardrail systems are to be small enough to prevent objects from falling through the opening.

Ladder Safety Systems

Required over 24 feet - carrier, safety sleeve, lanyard, connectors and body harness

Personal Fall Protection Systems

It is important to plan prior to using personal fall protection systems.

Probably the most overlooked component of planning is locating suitable anchorage points.

If you cannot tie off, then scaffolding is the answer – which takes planning.

A personal fall arrest or travel restraint system that meets OSHA requirements shall be worn and attached to the boom or basket when working from an aerial lift.

Anchorage must be:

- Capable of supporting at least 5,000 pounds for each employee attached; or
- Designed, installed and used under the supervision of qualified person, as part of a complete personal fall protection system that maintains a safety factor of at least two.

Allowable Tie Off Points	Not Allowable
Structural steel	Conduit
Pipe over 5 inches with proper pipe supports	Conduit trays



Best Practices – Auditing

Inspection Form – Platforms & Fixed Ladders (note – many of these pictures are old and have been corrected; used for illustration only)

Name	Date	Department
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Platforms – less than 12 inches tall

Solid; sturdy; large enough for two feet with little overhang

Platforms – between 12 and 48 inches tall

Solid; sturdy; consider weight and mobility

Steps / ladder rungs with uniform spacing

Platforms – 48 inches and more tall

Hand rail, mid rail and toe board on all sides (except access way)

- hand rail must be 39” to 45” high
- mid rail must be 21” high
- toe boards / kick plates at least 3.5 inches high

- Platforms with 4 steps or more (top platform is not a step)
- side rails on both sides of the steps
 - ladder / rungs separate from platform structure
 - ladder side rails have to extend contiguous 42” above platform

Vertical clearance above stair trend to over-head obstruction must be at least 7’

Easy / smooth transition from ladder to platform – no side steps or reaching steps

All platforms above 4 feet need self-closing gate – chain is allowed if platform size does not allow gate

Steps over 50 degrees are ladders

Granger
Angle Meter, Magnetic Base, 0-90 Deg
STARRETT
Granger Item # 2ZUY8
\$27.10



Ladders – Fixed (see Ladder sheet for more information)

Fixed ladders leading to a working platform 48” or above must be equipped with a self-closing swing gate (chain allowed if size does not allow gate)

Fixed ladders to top of tanks, roofs, etc. must have handrails extending at least 6 feet along edges (wings).

Fixed ladders 20’ or more must have a cage beginning at 7’ from bottom to the top.

Replace frequently used portable ladders with mobile ladders / stair platforms or stationary work platforms

No issues

Solid; sturdy; large enough for two feet with little overhang



No issue

Solid; sturdy; consider weight and mobility

Steps / ladder rungs with uniform spacing



Needs step

Needs redo so pipe is not a trip hazard



Issues

No hand rails, mid rails, or toe boards

No side rails on ladder



Ladder rungs are not adequate

Hand rails not complete

No mid rail or toe boards



“Store bought” movable platforms are allowed without toe board



Ladder side rails do not go above platform



Good

Side rails are contiguous

Side rails go above platform

All platforms above 4 feet need self-closing gate – chain is allowed if platform size does not allow gate



Bad transfer from ladder to platform



Needs wings – 6 feet each side



If you are only going to the top of the ladder and will be looking in a hole, and not leaving the ladder, then; this type of ladder does not need a gate or chain; and
Do not need wings



Due to height; steps / ladder rungs with uniform spacing needed



Ladder rungs should not be part of platform structure

Ladder side rails have to extend contiguous 42 inches above platform

No toeboards



Best Practices – Auditing



Best Practices – WWS



Biggest Challenge – Human Behavior

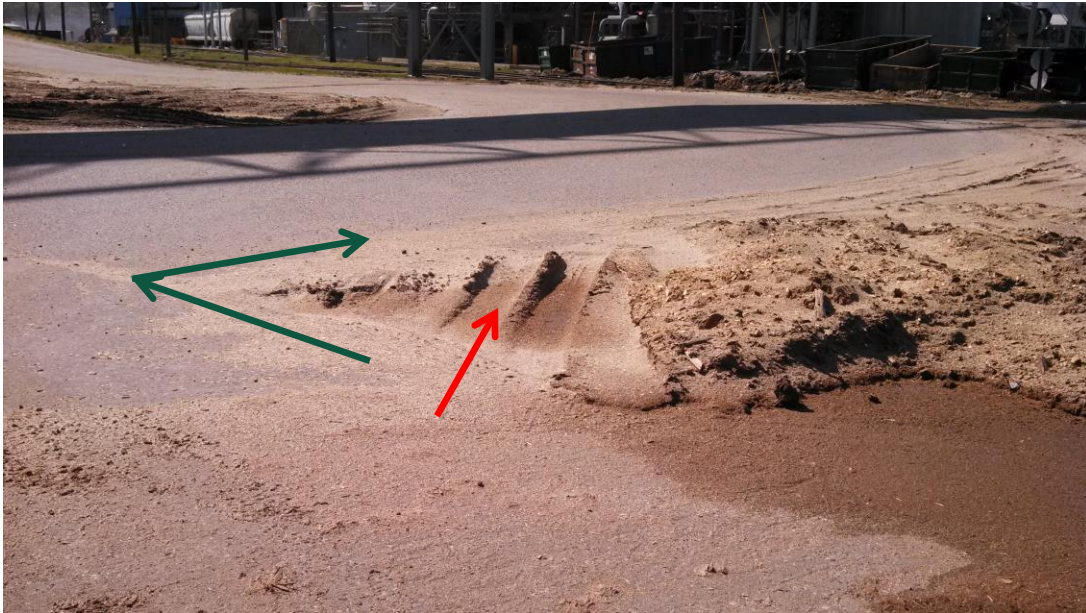


29 CFR 1910.21(b) Definitions

Stepstool means a self-supporting, portable ladder that has flat steps and side rails. For purposes of the final rule, stepstool includes only those ladders that have a fixed height, do not have a pail shelf, and do not exceed 32 inches (81 cm) in overall height to the top cap, although side rails may extend above the top cap. A stepstool is designed so an employee can climb and stand on all of the steps and the top cap.



Biggest Challenge – Human Behavior



Grating Missing

Grating In Place



Employee walking in an area, is able to see the u-drain grating in place to their right, proceeds to walk in stock unable to see the concrete floor.

Hidden Hazard – u-drain cover had been removed and not replaced.

Employee assumes grating is all in place, steps into the open u-drain and is injured.

Replace u-drain covers.
Do not leave open u-drains unattended.
Do NOT leave traps for others to find.



Is all grating in place under the water?

Or is there an open u-drain?



Tony Crow – INJAM



Safe Behaviors When Walking

- Create good housekeeping practices.
- Reduce wet or slippery surfaces, avoid when possible.
- Avoid creating obstacles in aisles and walkways.
- Maintain proper lighting.
- Wear proper footwear.
- Control individual behavior – anger, frustration, being late, running, rushing.
- Keep eyes on the path of travel, be aware of surroundings.
- No distracted walking.





If they do it often,
it isn't a mistake;
it's just their behavior.

- Dr. Steve Maraboli



WWS - Off the Job

Bicondylar Tibial Plateau Fracture



WWS - Off the Job



In Closing...

- Slips, trips, falls related to walking and working surfaces account for a majority of workplace injuries.
- OSHA's Subpart D is a good place to start to reduce walking and working surface injuries.
- Housekeeping and keeping surfaces clean, dry, and uncluttered can prevent many incidents.
- Personal behavior and being aware of your surroundings are always important.





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