WELCOME

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EHS COMMITMENT FROM THE TOP

My ambition is for Alcatel-Lucent to be the recognized leader in sustainability and responsible business innovation for the technology industry.

Michel Combes
CEO Alcatel-Lucent
2013 Sustainability Report

Right First Time
SAFE EVERY TIME

ZERO TOLERANCE SAFETY PRINCIPLES

e always use the appropriate Personal Protective Equipment and Fall Arrest systems when working at heights.

We never work under the influence of alcohol or drugs.

We never work on energized equipment or in the vicinity of high voltage power transmission lines unless qualified.

We always have a lift plan when performing a critical lift.

We never exceed speed limits or travel at speeds which are dangerous for the type of road, vehicle, or conditions.

We always wear seat belts when travelling in, or operating vehicles.

We never use a hand held phone or text while driving.

Fall Protection

LES107WG – December 2014

AGENDA

- EHS POLICY
- PURPOSE
- WHAT IS FALL PROTECTION?
- WHEN IS IT REQUIRED?
- SCISSORS LIFT AND BOOM LIFTS
- PERSONAL FALL ARREST SYSTEM
- PERSONAL FALL ARREST SYSTEM
- PERSONAL FALL RESTRAINT EQUIPMENT
- TRAINING REQUIREMENTS
- KIT COMPONENTS
- BODY HARNESS VS BODY BELTS
- HARNESSES STYLES
- LANYARD
- LANYARD USE INSTRUCTIONS
- LIFT ANCHOR POINT
- SNAP HOOKS AND CARABINERS
- IMPROPER USE OF COMPONENTS
- ANCHORAGE POINT PLANNING
- INSPECTION, MAINTENANCE AND STORAGE
- OTHER CONSIDERATIONS
- RESCUE OPTIONS
- HANDS-ON EXERCISE

PURPOSE

This course is intended to train workers in:

- the identification of conditions that will require the use of fall protection
- correct use, inspection and maintenance of personal fall protection equipment
- the identification of anchorage points
- actions that need to be taken during an emergency
- conditions that can develop after a fall

Fall Protection

Folklore has it that cats have 9 lives and that when dropped, they will always land on their feet.

Reality is that humans have only one life and when falling from one level to another, they will usually land on their head.

Myth Vs. Fact

- Myth: Fatal falls occur from heights over 50 feet.
- FACT: THE BODY CAN ROTATE 180º IN A FALL DISTANCE OF 1.1 meters (3.5 feet).
- Death is common in falls over 1.8 meters (6 feet).

Time History of a Fall

Elapsed Time (sec)	Free Fall Distance (in)	Speed (ft/sec)	Speed (mph)
0.0	0	0	0
0.1	2	3	2
0.2	8	7	5
0.3	18	10	7
0.4	31	13	9
0.5	48	16	11
0.6	70	19.3	13
0.61	72	19.6	13.3
0.7	95	23	16
0.77	144	25	16.9

Fall arrest equipment shall be rigged such that an employee can neither free fall more than 72 inches (6 feet), nor contact any lower level.

Fall or Slip?

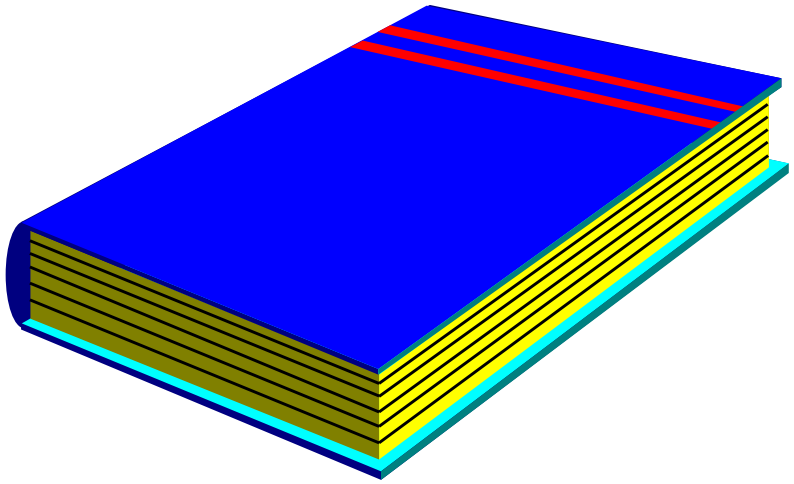
A slip or trip involves a fall to the same level. In some cases, a slip can lead to a fall.

A fall is an accidental loss of balance that permits an uncontrolled drop from one level to another.

Fall Protection Procedure

Global EHS Procedures – Section 4.0

This document describes Alcatel-Lucent's complete Personal Fall Protection Procedure.



When Is It Required?

A fall protection system consisting of a guardrail, safety net or personal fall arrest system should be provided for all Alcatel-Lucent employees that:

- walk and/or work within 1.8 meters (6 feet) of an unguarded surface 1.8 meters (6 feet) or more above a lower level
- work above dangerous equipment
- climb a fixed ladder without a cage greater than 6 meters (20 feet) in length.

When Is It Required?

continued …

- When working on vertical lifting devices under the following conditions:
  - Scissor Lifts
    - When side guard rails are not locked into position and access openings are not closed

      NOTE: For ALU work side guard rails must be up, access openings closed and your feet on the floor of the platform. No exceptions.
  - Boom Lifts
    - Always required
  - Bucket Trucks (not approved for Alcatel-Lucent use)
    - always required

Scissor Lifts and Boom Lifts

Scissor Lift (Fall protection is not required in this particular case)

Boom Lift – always required

Bucket Trucks (always required)

Bucket Truck- always required

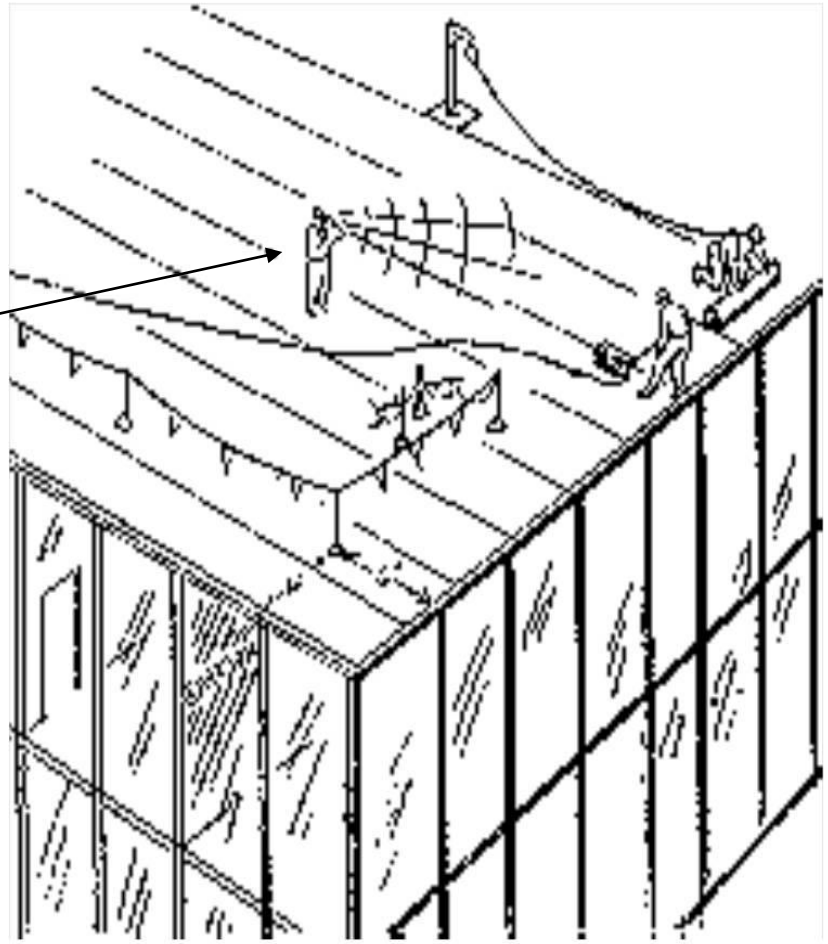
When Is It Required?

Examples of fall protection practices when working within 1.8 meters (6 feet) of an unguarded (no wall or guardrail) roof edge.

Use of Personal Fall Protection Equipment

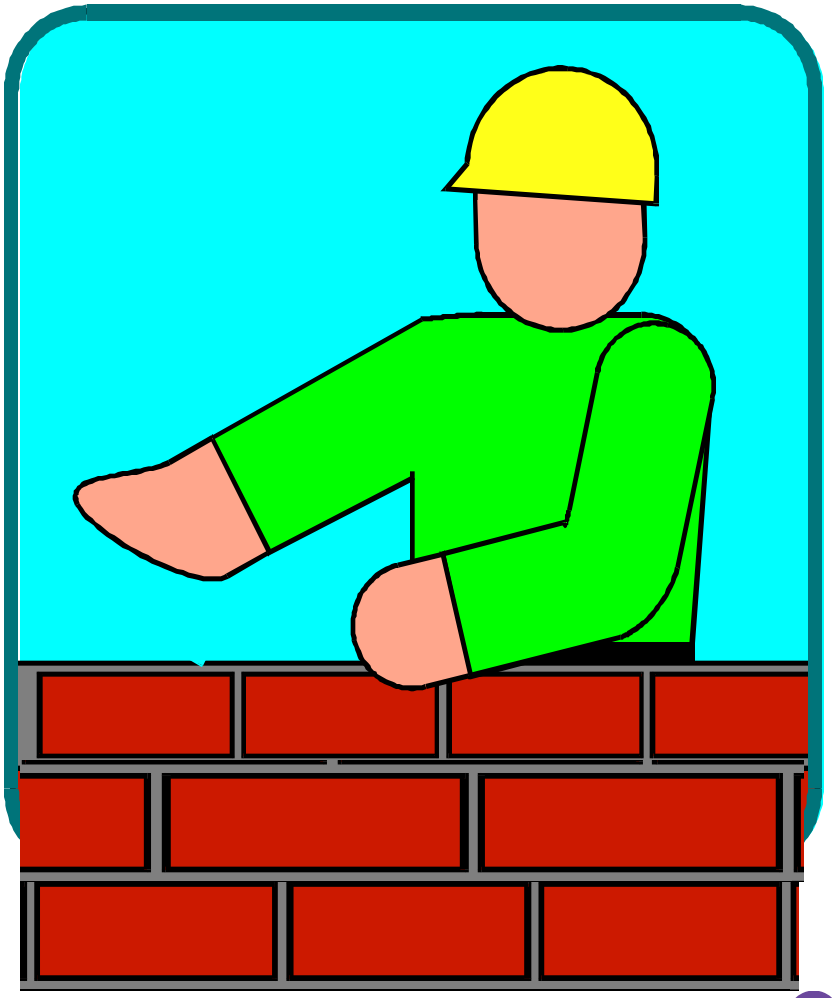
Designated Monitor
(Not endorsed by ALU EH&S)

Clear designation of areas requiring the use of fall protection.



When Is It Required?

A roof parapet may only serve as a guard rail if it is at least 1 meter (39 inches)high



Roof Parapet

In this case- fall protection is required as the roof parapet is not 39 inches (1 meter) tall

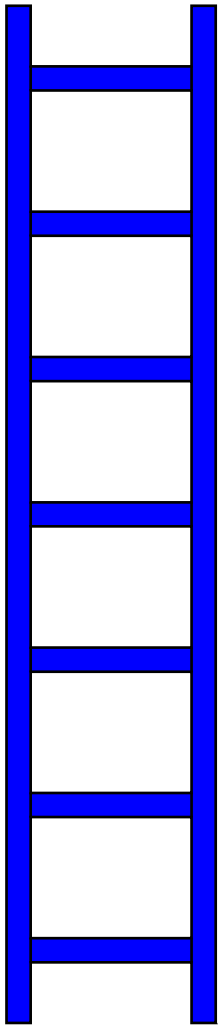
When Is It Required?

When working within 1.8 meters (6 feet) of an open freight door that leads to an area that is 1.8 meters (6 feet) or higher from the ground.

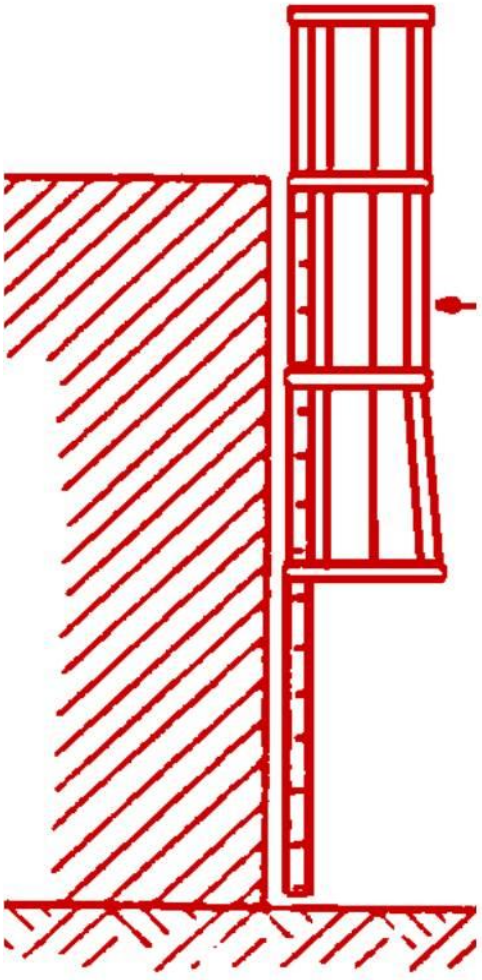
When Is It Required?

When working within 6 feet of a floor opening (such as a cable hole with removed plates) that is located 1.8 meters (6 feet) or more from the next level.

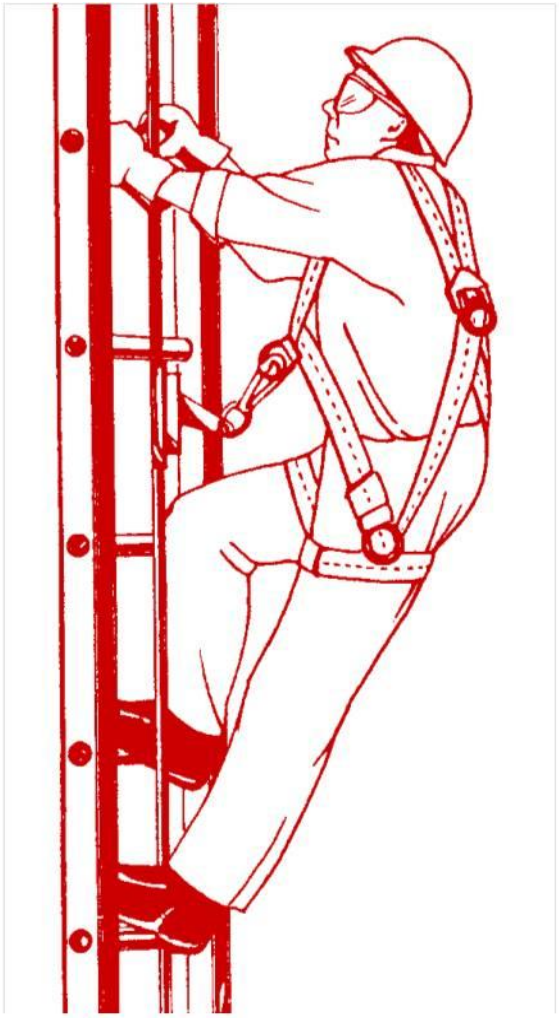
Fall Protection Options For Fixed Ladders Without A Cage



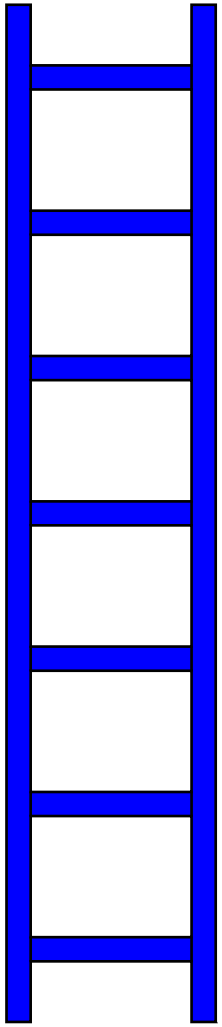
Cage



Carrier Rail

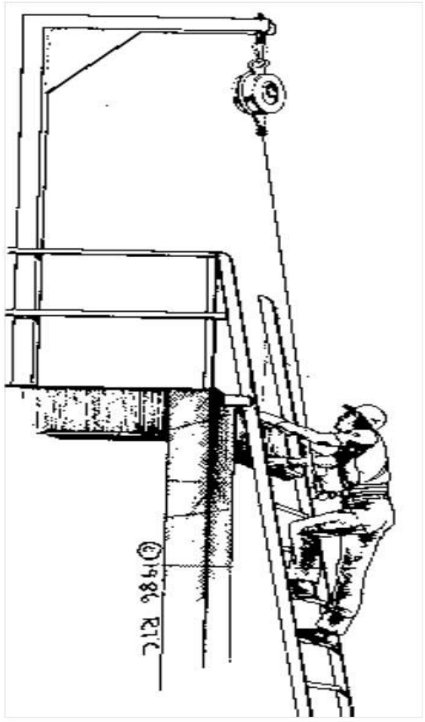


Fall Protection Options For Fixed Ladders Without A Cage



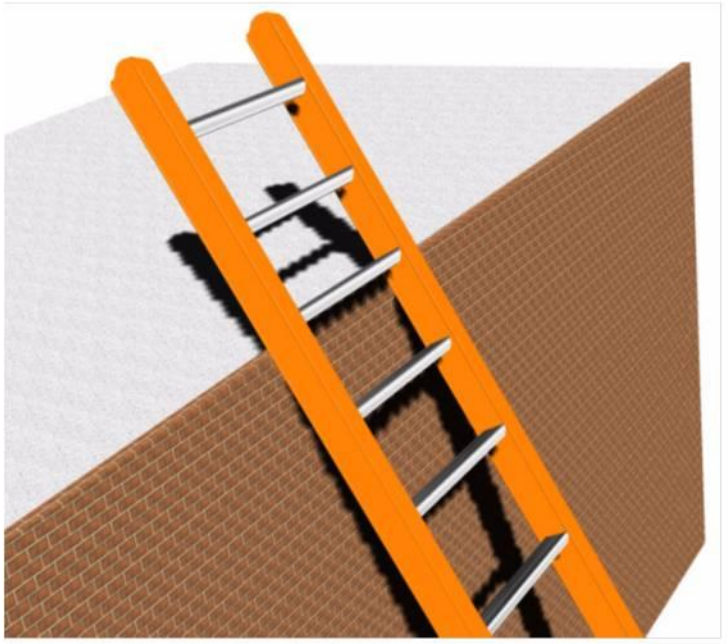
Vertical Life Line

Self Retracting Vertical Lifeline



When Is Personal Fall Protection Required?

May not be required when working on a portable ladder, but may become necessary after stepping off and working on the roof.



When Is It Required?

Fall Protection not required here since guardrail is present.

The green ladder inside the scissor lift can be used to access this panel.

Portable ladders are not to be used on the truck lift platform.

Personal Fall Arrest System

- A passive system that limits the workers fall from the working level.
- Limits free fall to shortest possible distance, but no more than 1.8 meters (6 feet).
- This is the method typically employed when working at heights.

Personal Fall Restraint System

- A passive system that PREVENTS the workers fall from the working level.
- In this case, the system does not allow workers to fall to a lower level but rather restricts how close they can get to the fall hazard.
- This is the method of fall protection that ALU workers shall employ when working in a boom lift.

Training Requirements

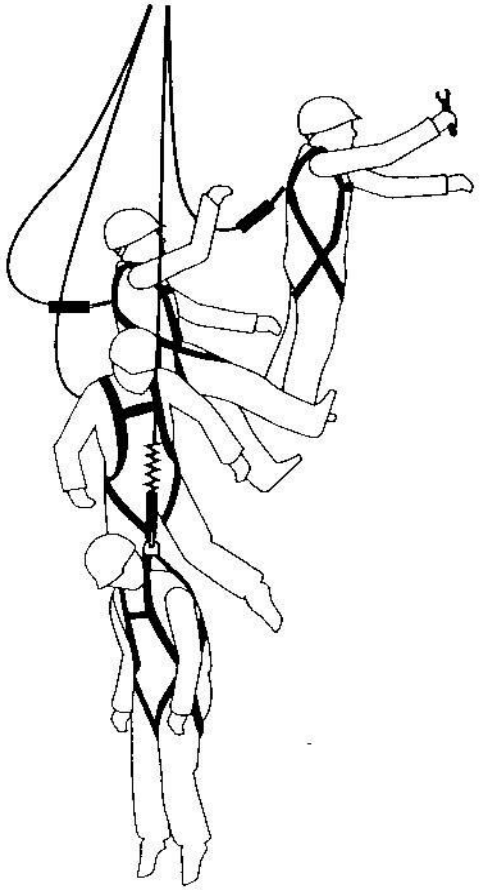
All Alcatel-Lucent employees that use personal fall protection systems should receive training that includes:

- identification of fall hazards
- equipment inspection & maintenance
- proper set up & use of equipment
- identification of anchorage point and proper tie-off procedures
- rescue procedures

Personal Fall Arrest System

Three terms to understand how the system works:

- Free fall
- Deceleration distance
- Arresting force



Free Fall

Falling before the fall arrest system begins to limit fall

Free fall distance should not exceed 1.8 meters (6 feet).

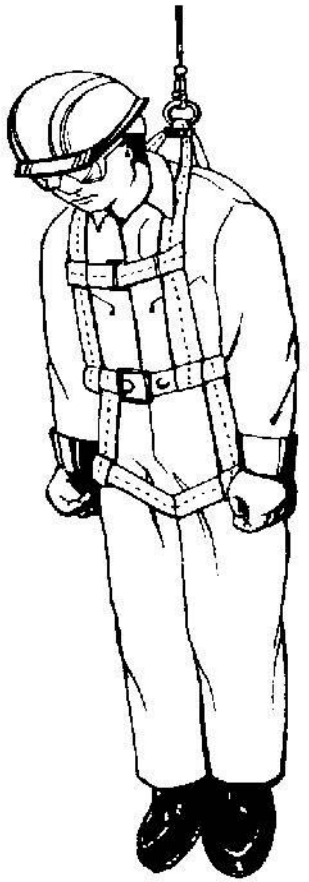
Deceleration Distance

The distance measured from when the shock absorbing lanyard activates to when the free fall comes to a stop.

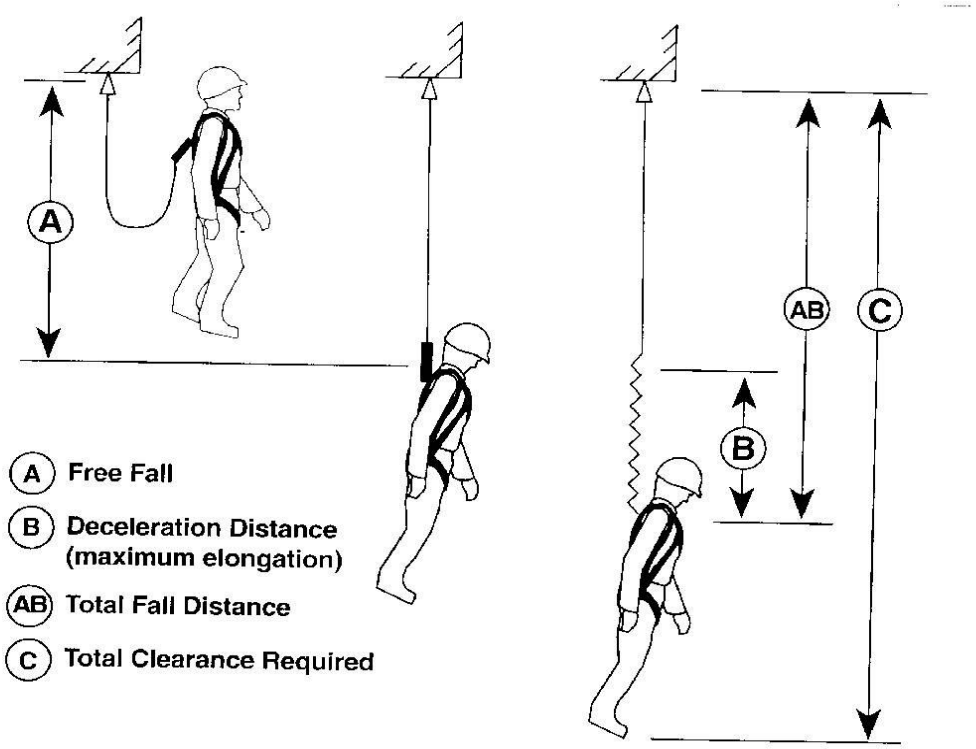
Should not exceed 1.1 meters (3.5 feet).

Arresting Force

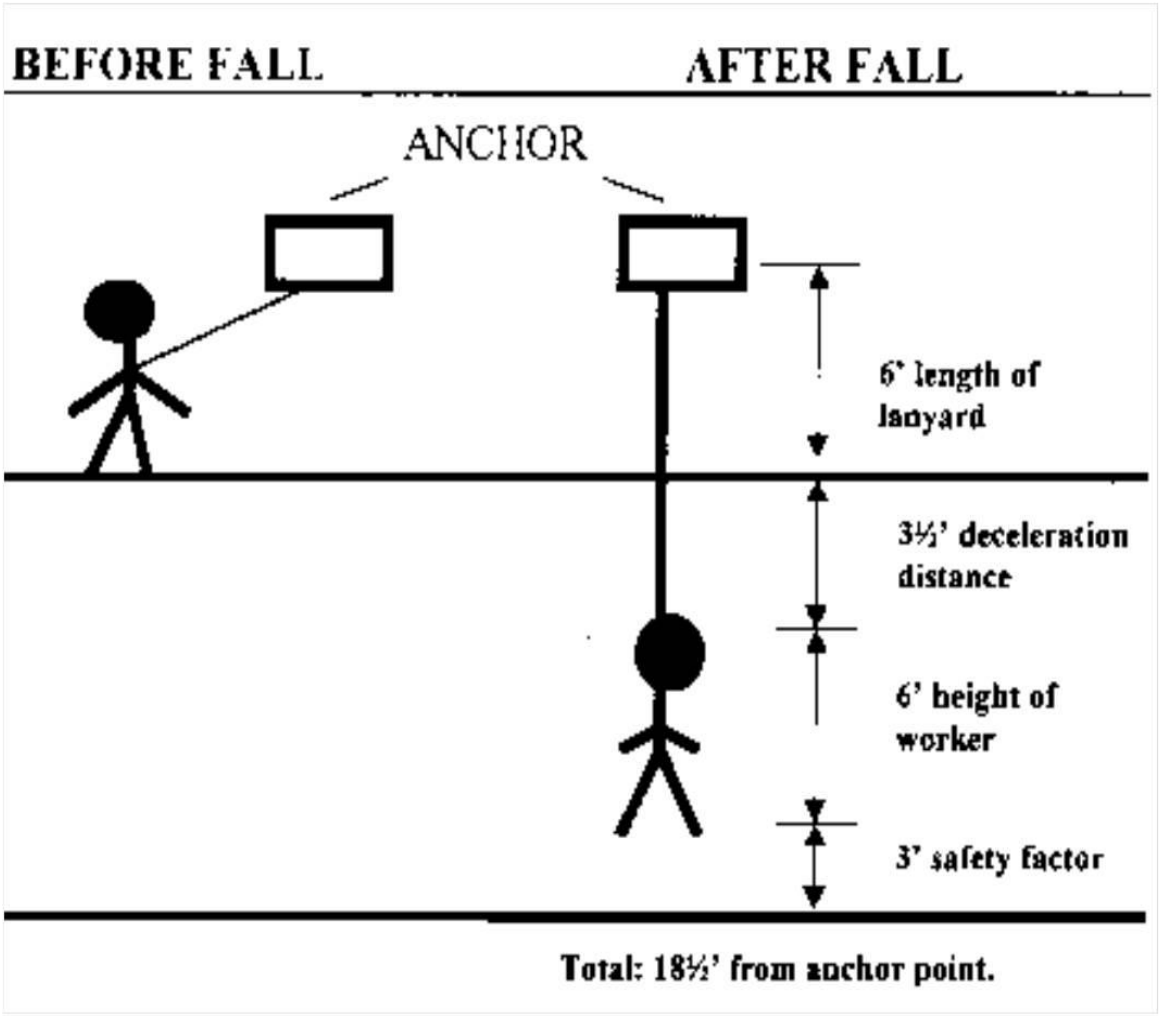
- The force needed to stop the fall.
- The greater the free fall distance, the greater the force required to stop
- Crucial when determining anchorage strength.



Basic Definitions



Fall Clearance Calculation



Personal Fall Arrest System

Basic system includes:

- Anchorage Point
- Shock Absorbing Lanyard
- Snap Hooks and Carabiners
- Full Body Harness

Other Components:

- Lifeline
- Deceleration Device

Fall Protection Kit Components (NAR Region example)

Cable sling

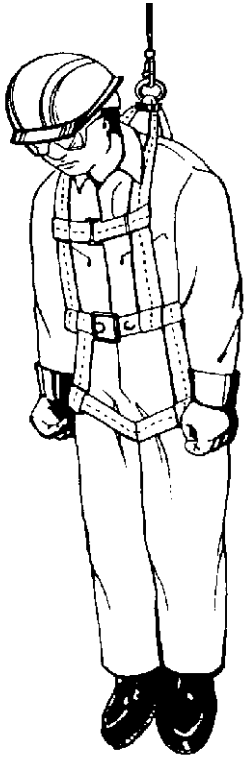
Lifeline (100 ft rope)

Self retracting lanyard – (short stop)

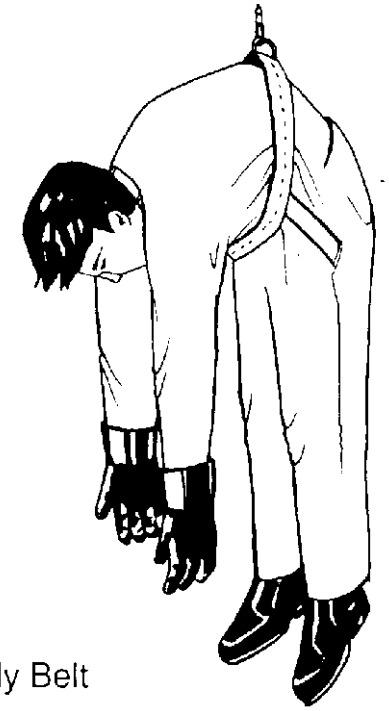
Rope grab – with shock absorber

Full Body Harness Vs Body Belt

A full body harness distributes the force throughout the body.

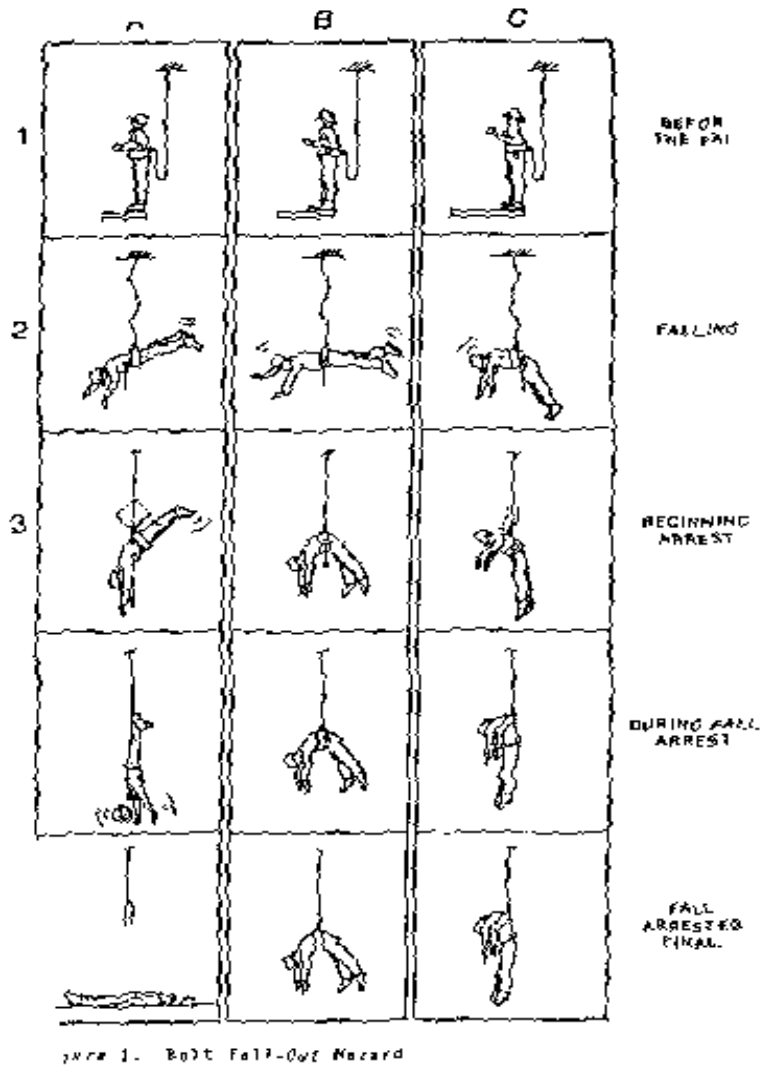


Full Body Harness



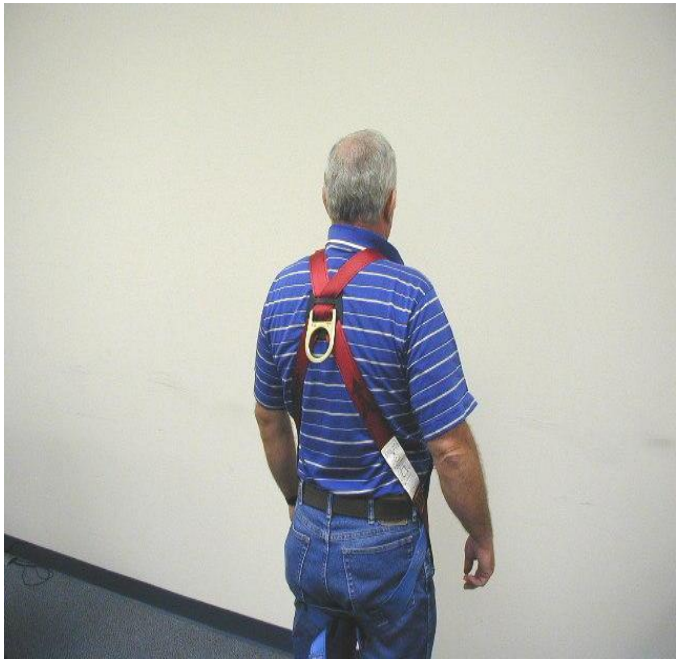
Body Belt

Body Belt Effects During a Fall



Body belts are not authorized fall arrest or fall restraint equipment for ALU workers. A full body harness must be used.

Harness Styles Front and Back View (NAR Region)



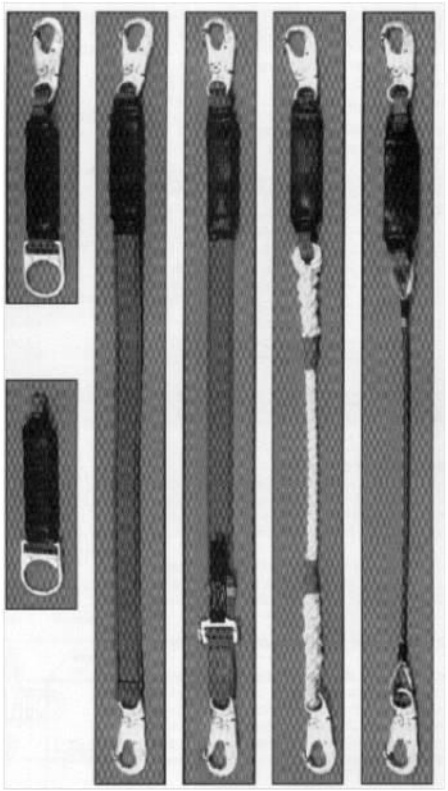
NOTE: 300 LB (136 kg) weigh limit - 275 lb. (125 kg) + tools)

Use of Equipment: Self Retracting Lanyard Attachment (NAR Region)

Use of Equipment: Rope Grab (NAR Region)

Shock Absorbing Lanyard

A lanyard is a short, flexible line.
Lanyards used by Alcatel-Lucent as part of the fall arrest equipment have shock absorbers attached.



Absorber engages at 450 lb. (204 kg) - 900 lb. (408 kg)

Shock Absorbing Lanyard

- Designed to absorb up to 80% of the arresting force.
- Reduce impact of the fall arrest, avoiding sudden stops and possible injury.
- Elongation length must be considered when calculating fall distance.

Shock Absorbing Lanyard

Restraint Lanyard

Description: SINGLE LEG ADJUSTABLE, 6 FT. WORKMAN RESTRAINT LANYARD with LC SNAPHOOKS (MSA Part No. 10072499 – NAR Region).

Lanyard is intended to prevent the worker from being able to fall out of the work platform. Do not use it for applications other than boom lifts unless you have prior EH&S approval.

Lanyard Use Instructions

1. Attach one end of the lanyard to the back D-ring of the harness.

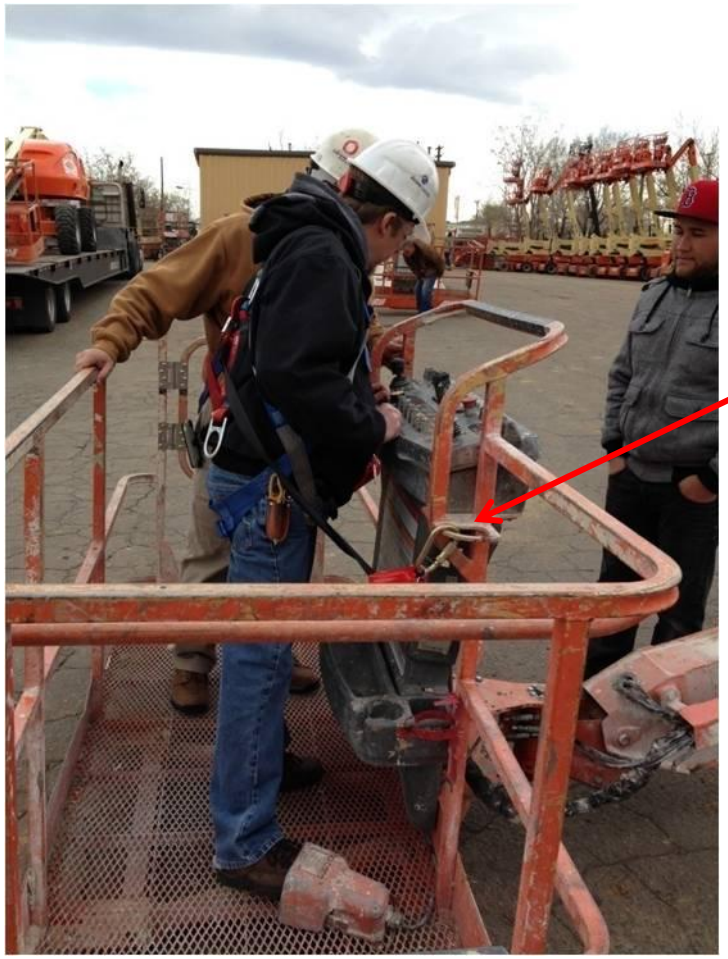
2. Attach the other end to the anchor point in the boom lift.

3. Stand at the farthest point from the anchor point in the lift platform. Shorten the lanyard by sliding the adjustment buckle until the lanyard is tensioned tightly.

Attachment to D-Ring

Clip the snap hook from the 6-foot restraint lanyard **directly to the BACK D-ring.**

Lift Anchor Point



The anchor point on this JLG lift is near the platform controls. It is labeled with a decal.

Use only designated anchor points on lifts.

Refer to your lift's operator manual if the location of the anchor point is not clear.

Only one person can attach to each anchor point.

DO NOT…

Use lanyards or harnesses other than shown here unless you receive approval first from your EHS Regional Manager.

Modify your fall protection equipment in any manner.

Use anything other than the designated anchor point on the aerial lift. It should be labeled so there is no confusion.

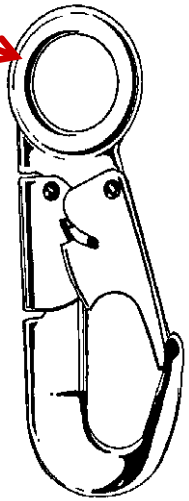
Wear personal fall protection equipment unless you have first been trained by your Regional EHS Manager.

Use the fall protection equipment even after you have been trained without first contacting your Regional EHS Manager to make sure your knowledge is current and sufficient.

Snap Hooks and Carabiners

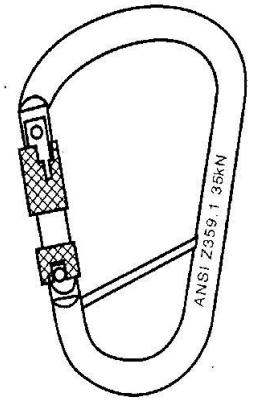
- Snap hooks and carabiners are used to connect components of the fall arrest system to each other (e.g., lanyard to the harness D-ring) or to an anchorage point.
- Do not position snap hooks so that the force of a fall will be transferred to the gate of the snap hook.
- Improper use can lead to accidental disengagement under certain fall conditions.

Neutral Eye of a Snap hook



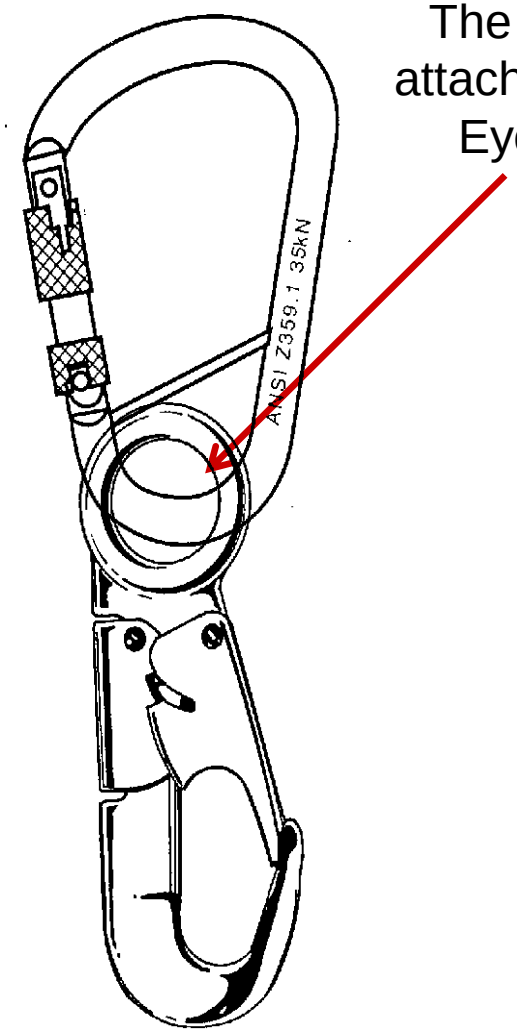
Snap Hooks

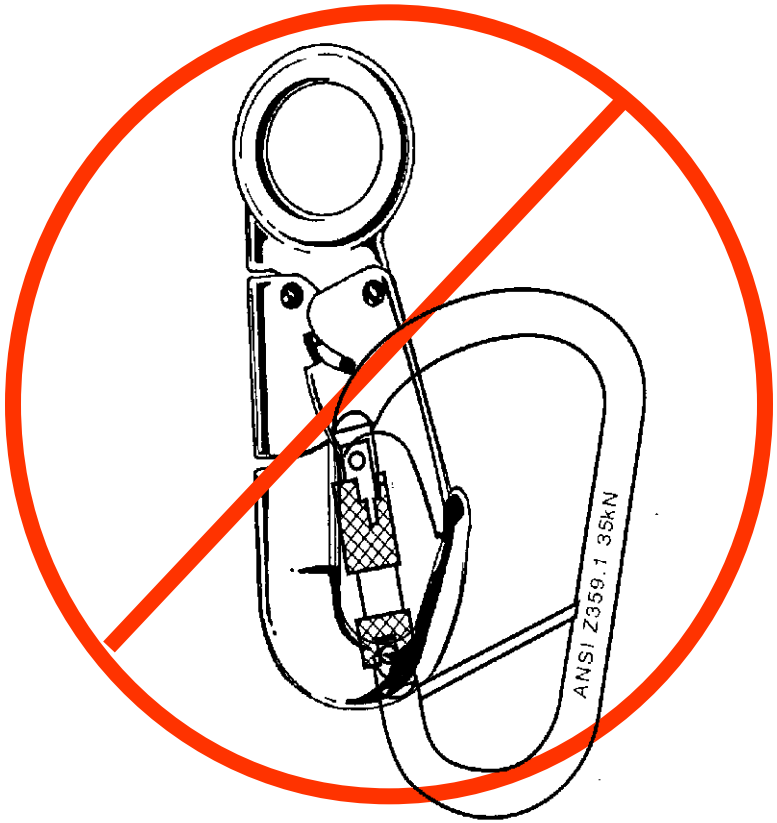
Carabiner



Proper Use of Components

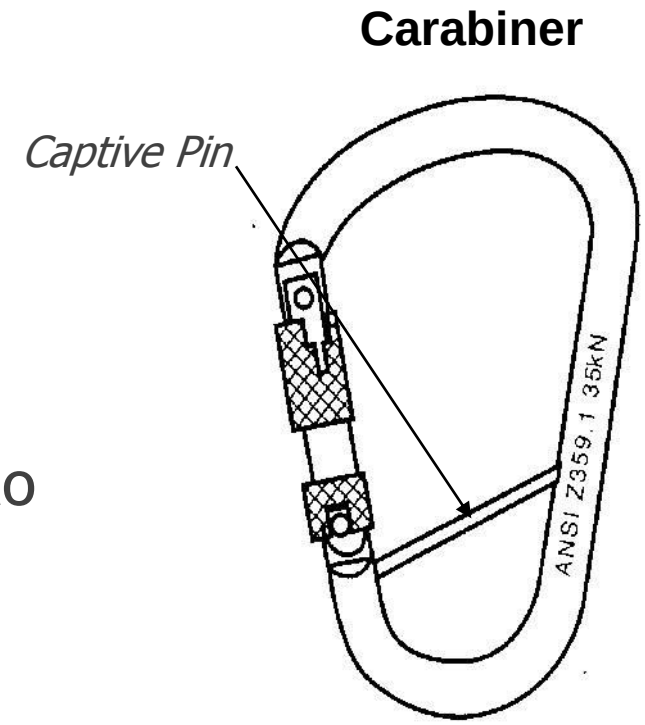
The carabiner should be attached only to the Neutral Eye of the Snap hook





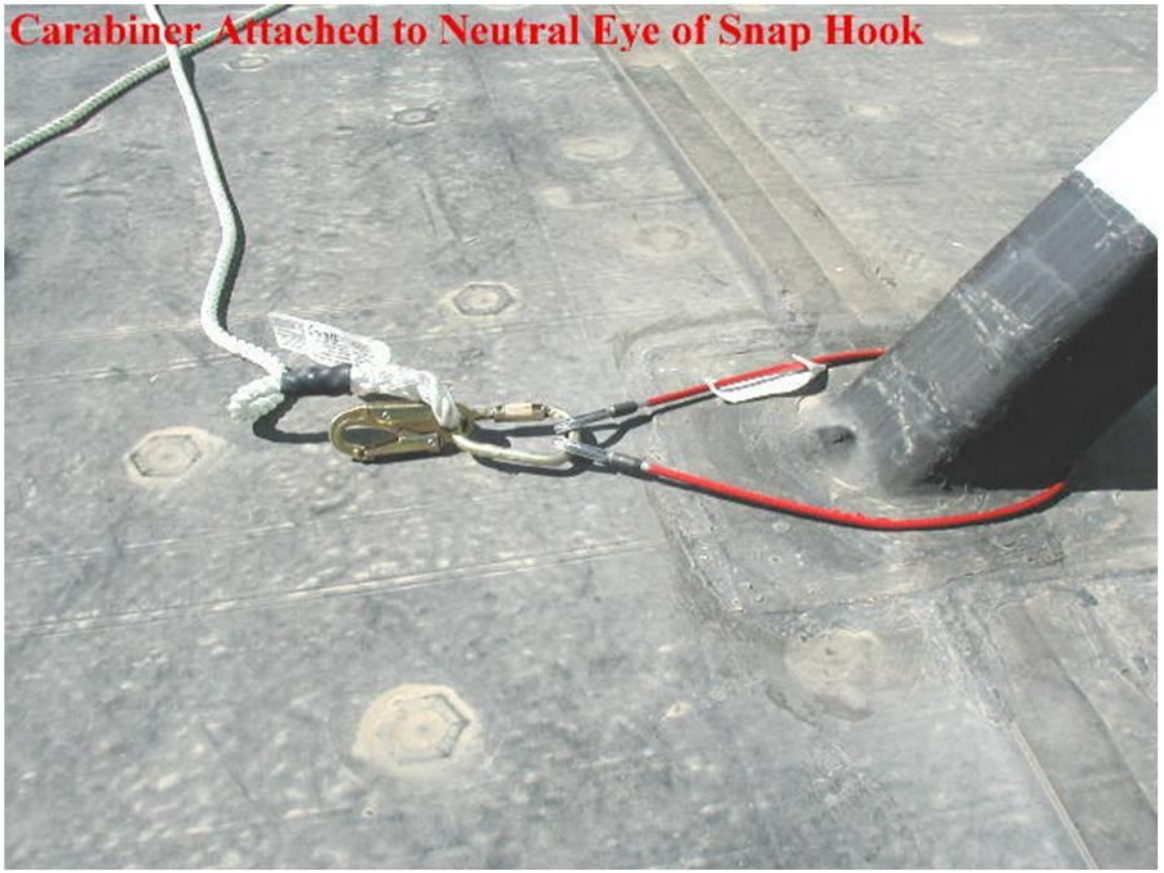
Use of Components

Do not install carabiner in a manner that applies a load to the captive pin.



Lifeline – Cable Sling Attachment

CORRECT CONFIGURATION



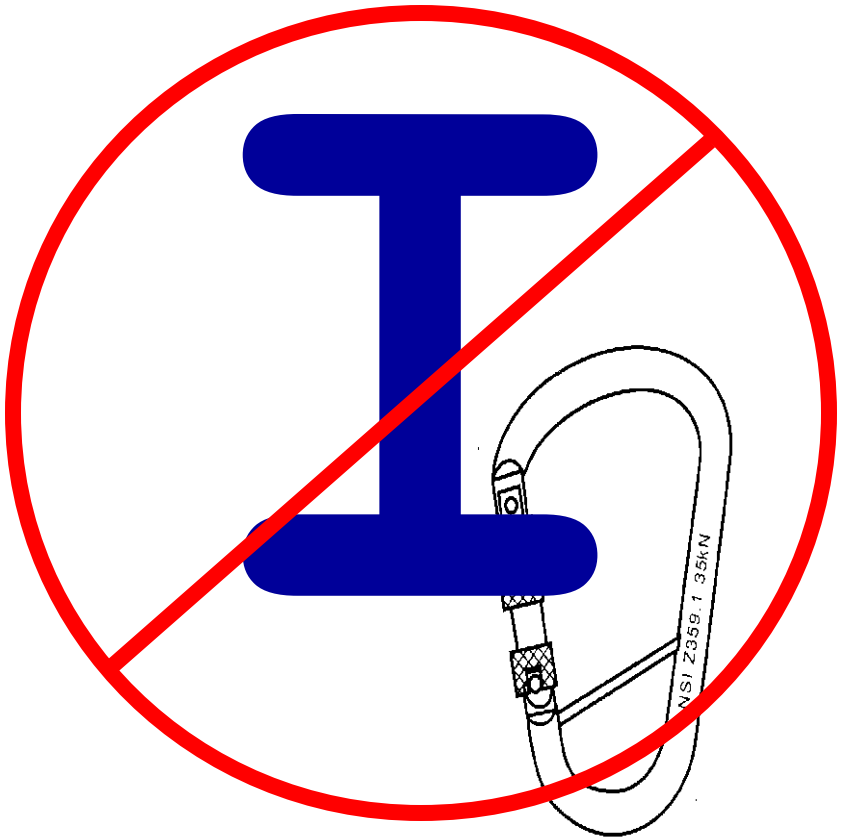
Wrong Cable Sling Attachment

The neutral eye has the rope and the carabiner is attached to the snap hook side and that is not allowed as it does not give a secure connection and runs the risk of accidental disengagement .

Carabiner is not used here and the cable sling is attached directly to the snap hook which is an unstable connection.

Improper Use of Components

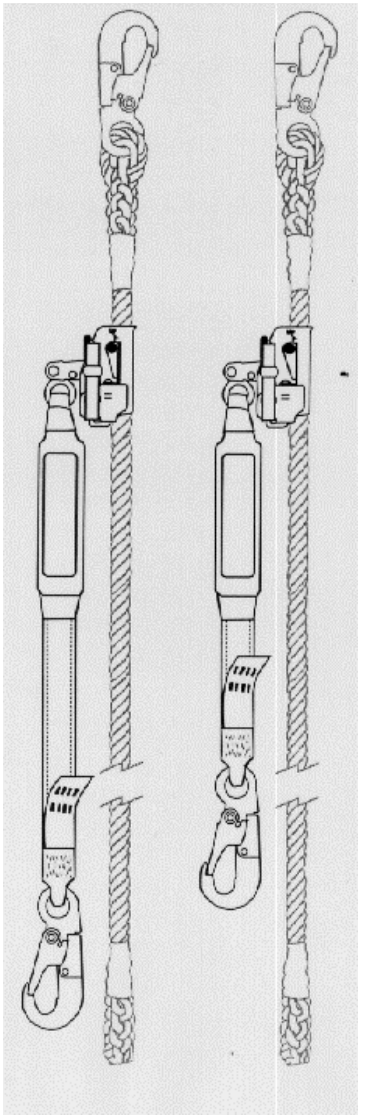
Do not attach snap hooks or carabiners directly to the lip of an H or I beam.



Vertical Lifeline

A vertical lifeline is the rope suspended from the fixed anchorage to which a rope grab is secured.

Each worker must have separate lifeline.



Horizontal Lifeline

A horizontal lifeline is a rope connected to anchorage's at both ends stretched horizontally.

- The horizontal lifeline must have sufficient strength to arrest the fall of multiple users (when applicable).
- Maintain a safety factor of 2.

Designed, installed and used under the supervision of a qualified person.

Qualified Person
When Using a Horizontal Lifeline

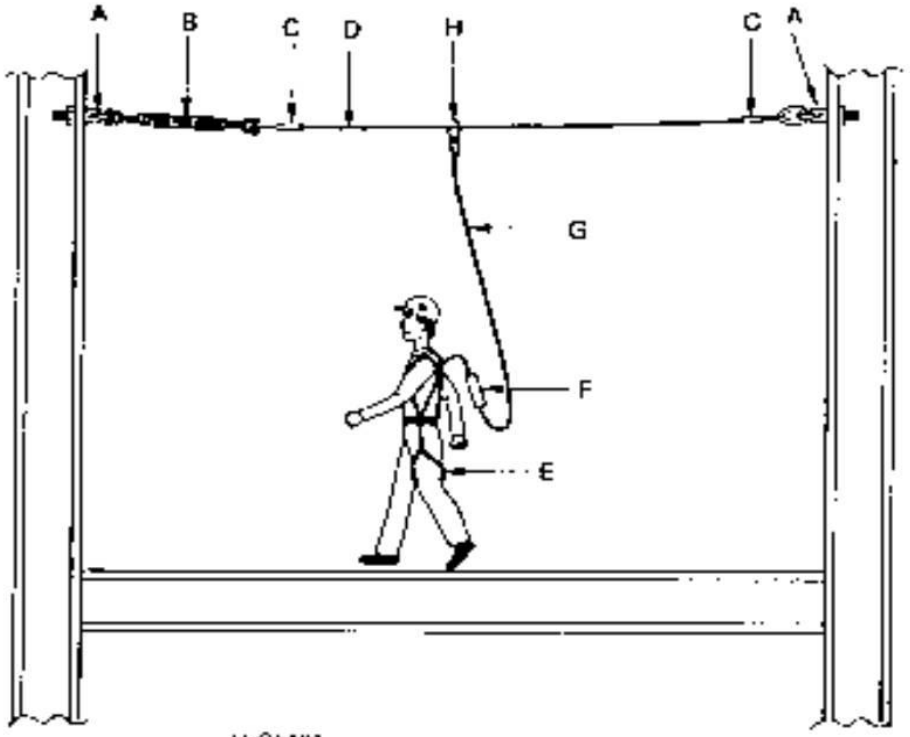
Person who:

- has a recognized degree, certificate, or professional standing

  or

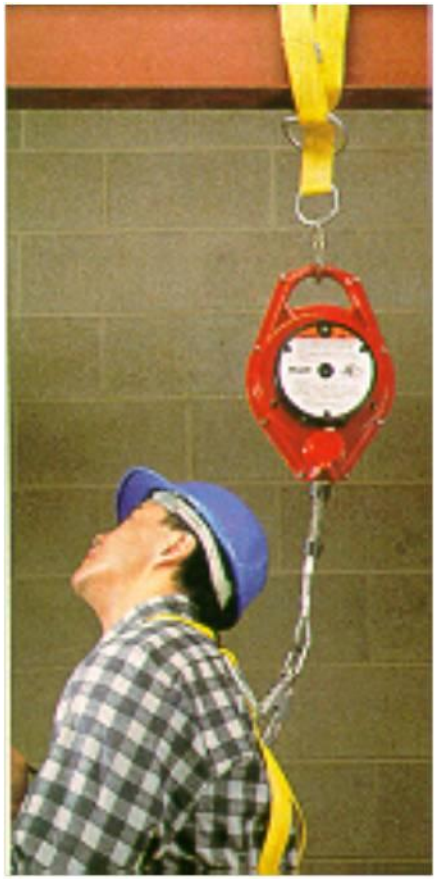
- by extensive knowledge, training, and experience, has successfully demonstrated ability to solve or relating to the subject matter, the work or the project.

Horizontal Lifeline



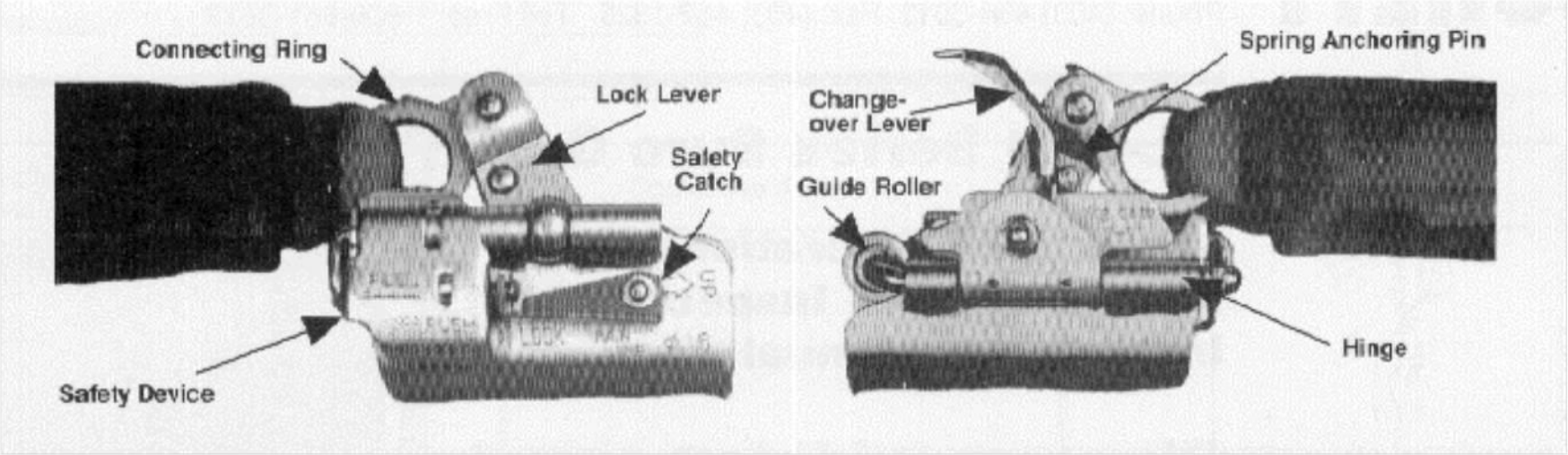
Self-Retracting Lanyard

- Hangs from an anchorage point above the work area.
- Automatically retracts and extends as the worker moves.
- Arrests a free fall within 2 feet.



Rope Grab

A rope grab is the deceleration device that travels on the vertical lifeline which is attached to the anchorage point. It automatically engages the lifeline and locks to arrest the fall.



Rope

Selection

- Rope properties, conditions subjected, anticipated load, and necessary length must be considered.

Preparation For Use

- Uncoil, un-kink, prevent unraveling, store for immediate use.

Care

- Avoid sharp bends, tie around smooth surface, avoid dirt, grit and exposure to heat & chemicals.

Inspection

- Conduct before each use.
- Look for broken strands or fibers, cuts, melted or charred fibers, extreme softness or limpness, chemical damage, decay, and discoloration.

NOTE: Rope used for one person must withstand 4500 lb tensile load.

Using the Fall Arrest System

Anchorage is the point of attachment for the system (horizontal/vertical lifeline or lanyard):

- Usage
- Stability
- Independence
- Height
- Location
- Shape
- Strength

Anchorage Point Planning

Height

- Reduces fall to the shortest distance possible
- Avoid possible collisions that can cause injury

Anchorage Point Planning

Location

Must be located so that:

- if a free fall occurs, the attached worker will not collide with any lower level hazard
- the swing fall is reduced
- is reachable, to permit connection without a hazard

On Boom Lifts:

- refer to your lift's operator manual if the location of the anchor point is not clear.
- anchor points provided by the equipment manufacturer is the only location you are allowed to clip your lanyard
- only 1 worker can attach to each anchor point on a boom lift

Anchorage Point Planning

Shape

- **Must be** compatible with the equipment's attachment method.
- **Protect against** sharp/angled edges.
- **A** round anchorage is preferable to a square anchorage.

Anchorage Point Planning

Strength

- Must be able to support the load developed during activation of the fall protection system for each person attached plus a safety factor.
- Structural integrity unaffected by the local environment, or contamination (weather, paint, corrosion, abuse)
- Should be at least 4 times the diameter of the rope.
- Must be able to withstand a minimum of 5000 pounds of arresting force.

Anchorage Point Planning

Strength

- A knot in the lanyard or lifeline at any location can reduce the strength of the line.
- Wrapping the a rope or lanyard around an anchorage and using the locking snap hook on the rope or lanyard greatly reduces system strength (10X).
- A tie-off around H or I beams can reduce strength of the line.
- Use a webbing lanyard, wire cable sling, wire core lanyard or padding.

Anchorage Point Planning

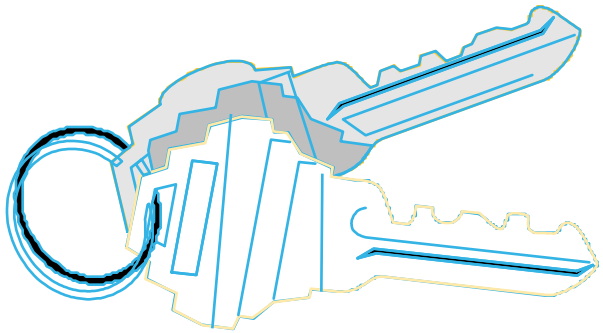
Usage

- Number of workers that can be safely attached to the same common point.
- Railings and sprinkler system pipes should not be used as an anchorage point.
- Electrical conduit should never be used as an anchorage point.
- Plastic/PVC pipe should never be used as an anchorage point.

Anchorage Point Planning

Stability

- Movement off the end can cause lifeline detachment resulting in a fall.
- Mobile points must not be moved while being used for anchorage.
- NOT acceptable to anchor around tire.



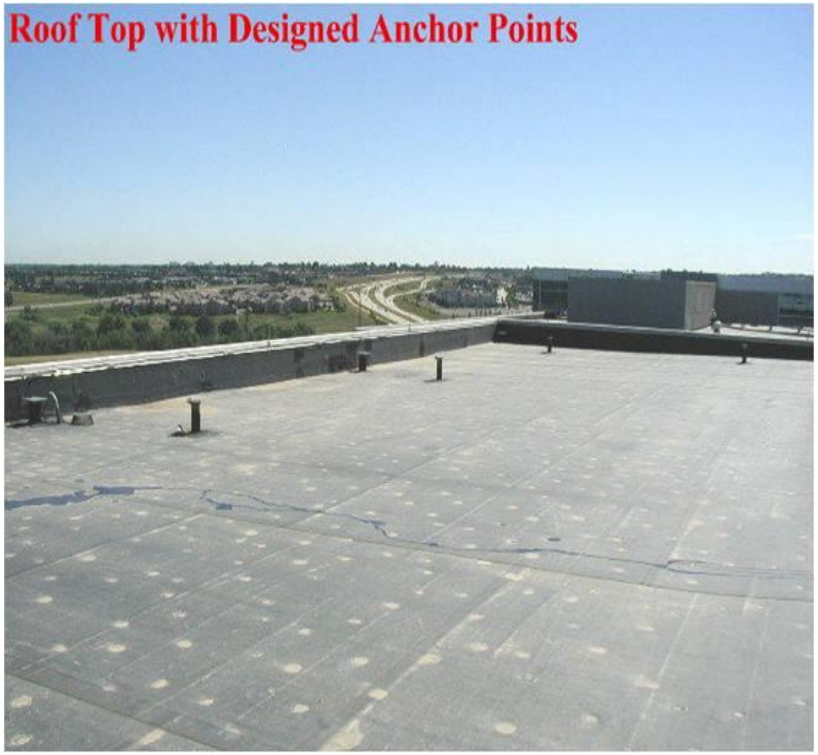
Anchorage Point Planning

Independence

- Each anchorage point MUST be independent from the main work positioning support.
- For example, when working on scaffolding the scaffold and it's support members can not be used as an anchorage point.

Anchorage Do's

Examples of different roof tops with designed anchorage points.



Anchorage Do's

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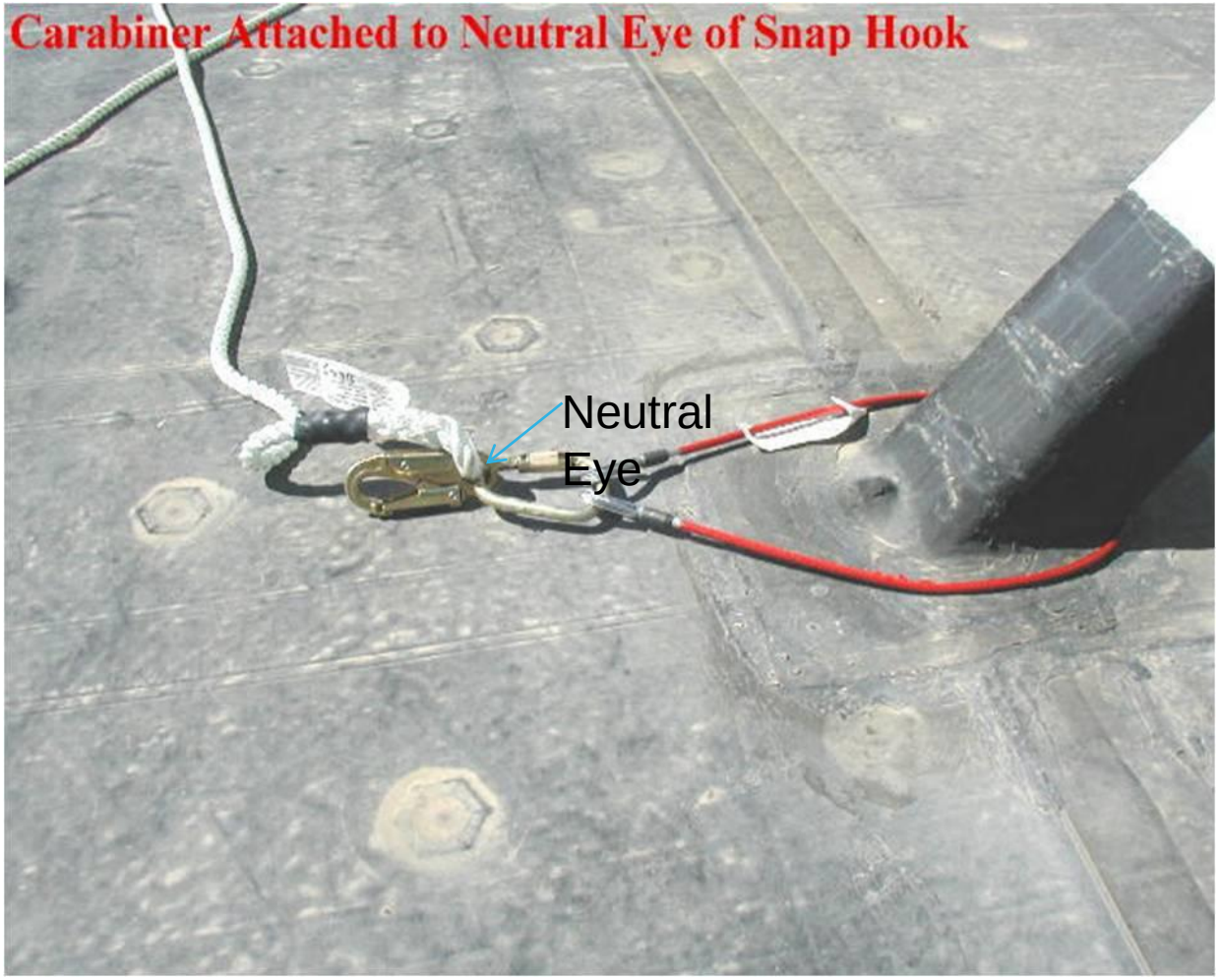

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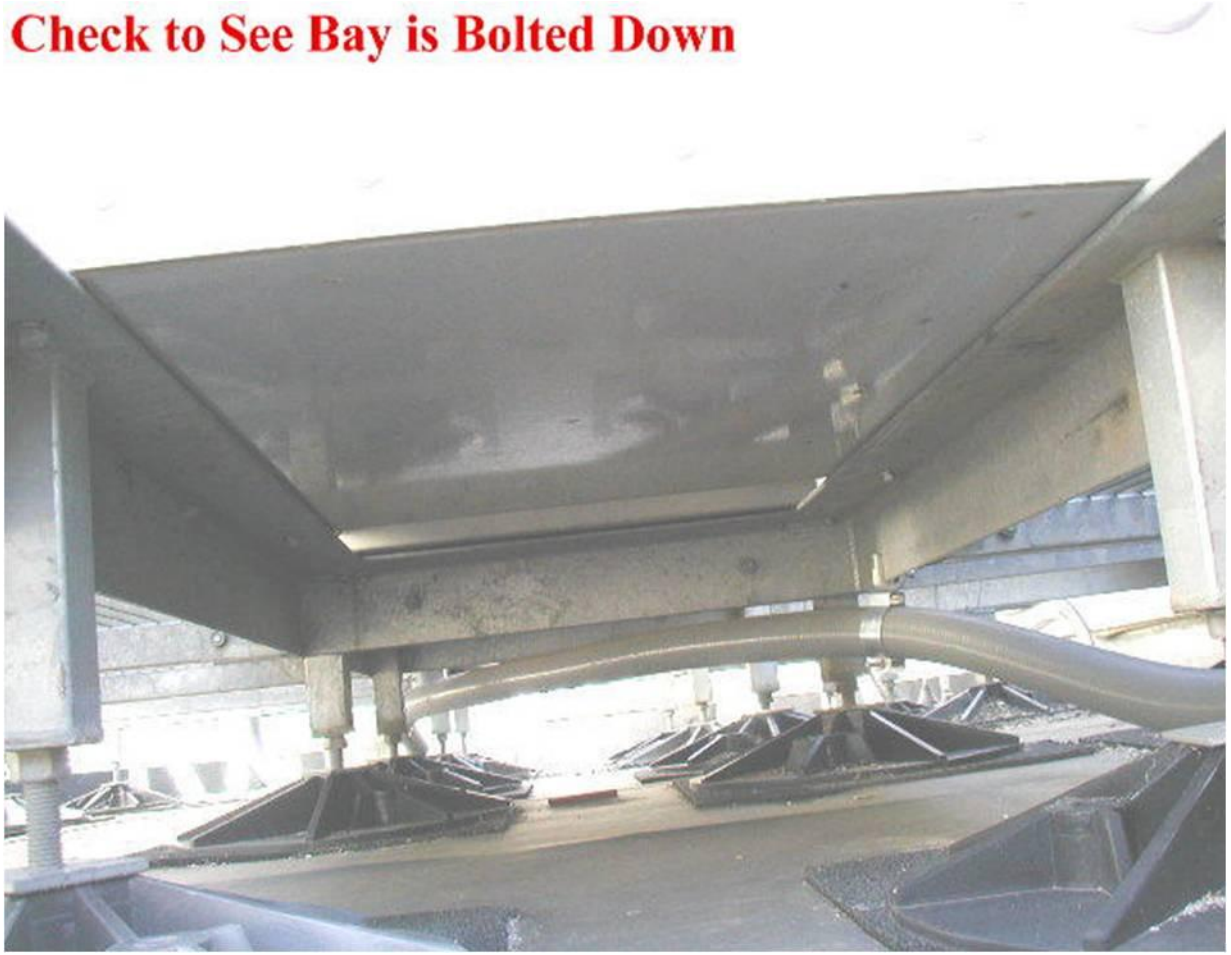
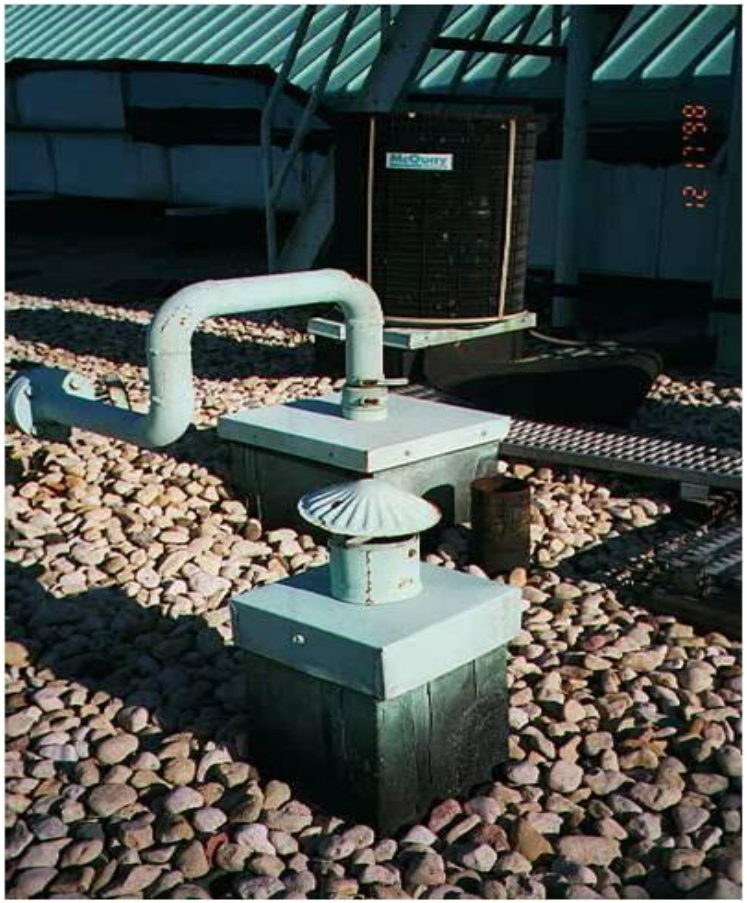


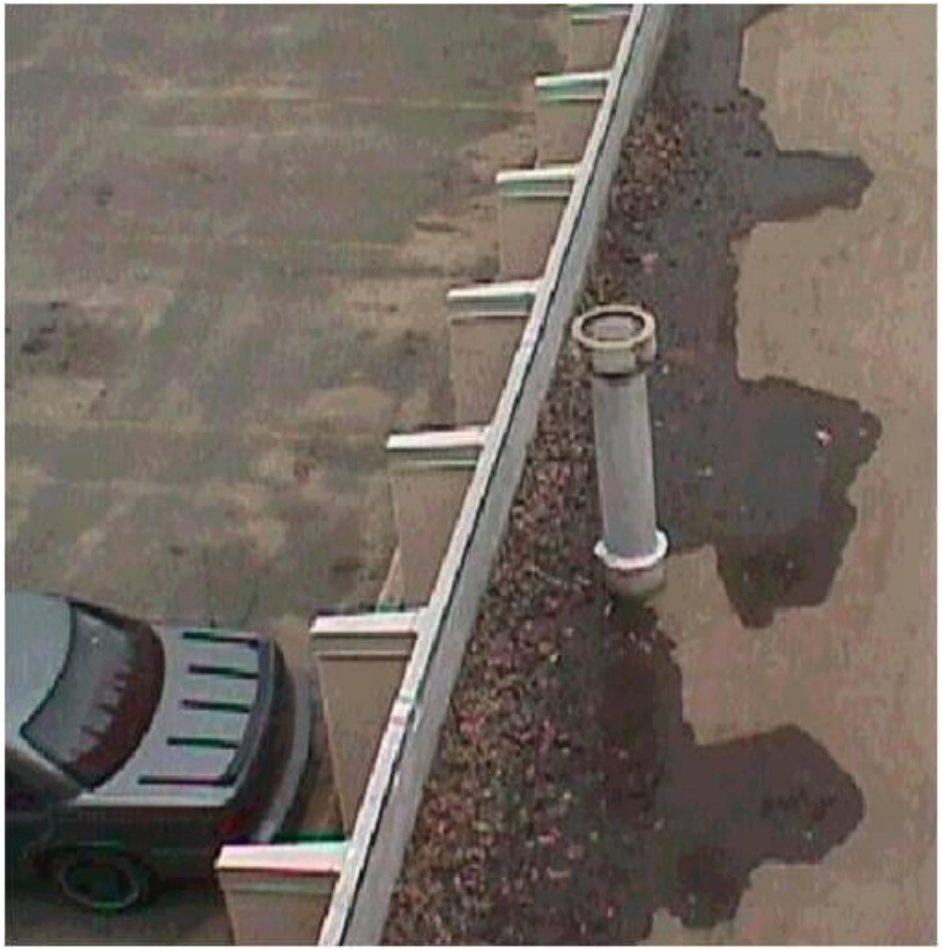
Anchorage Do's

Anchorage Don'ts

Anchorage Don'ts



Anchorage Don’ts



Anchorage Don’ts

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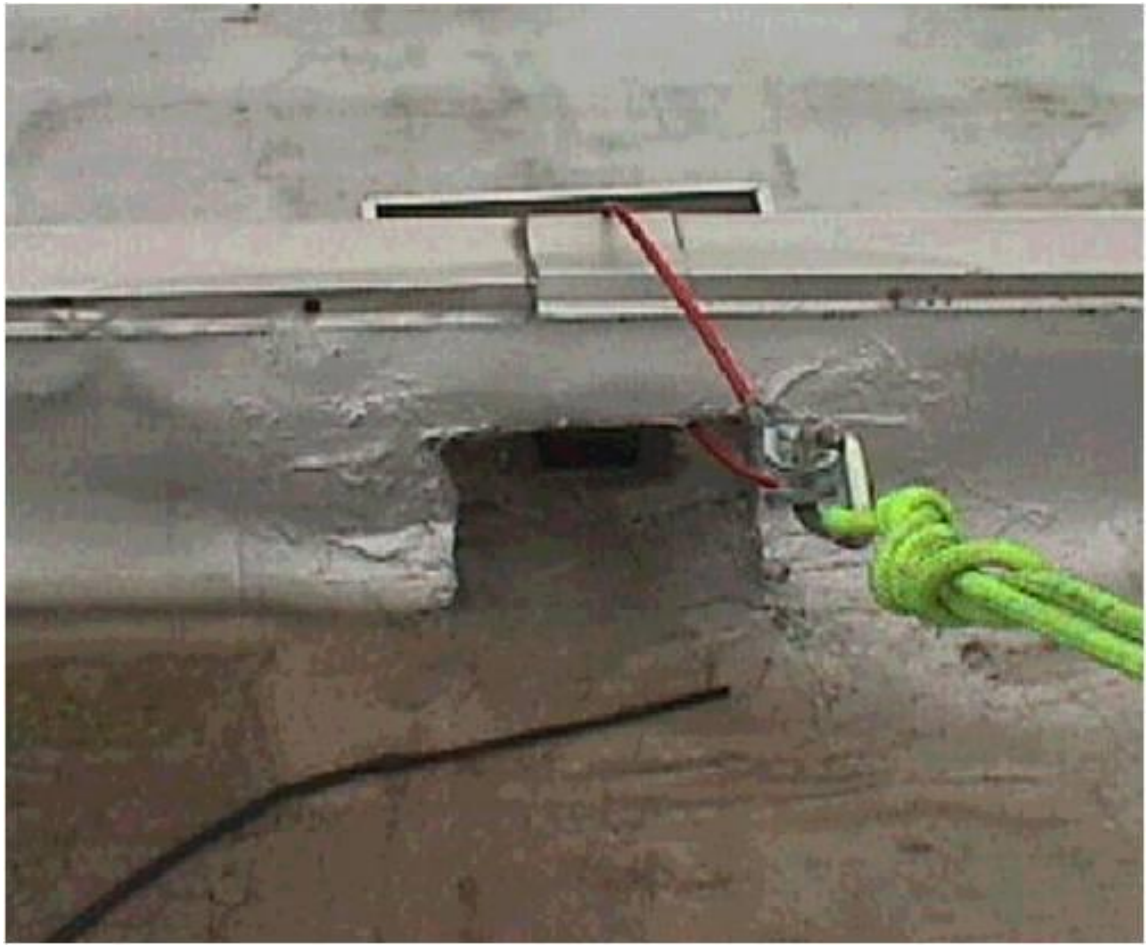

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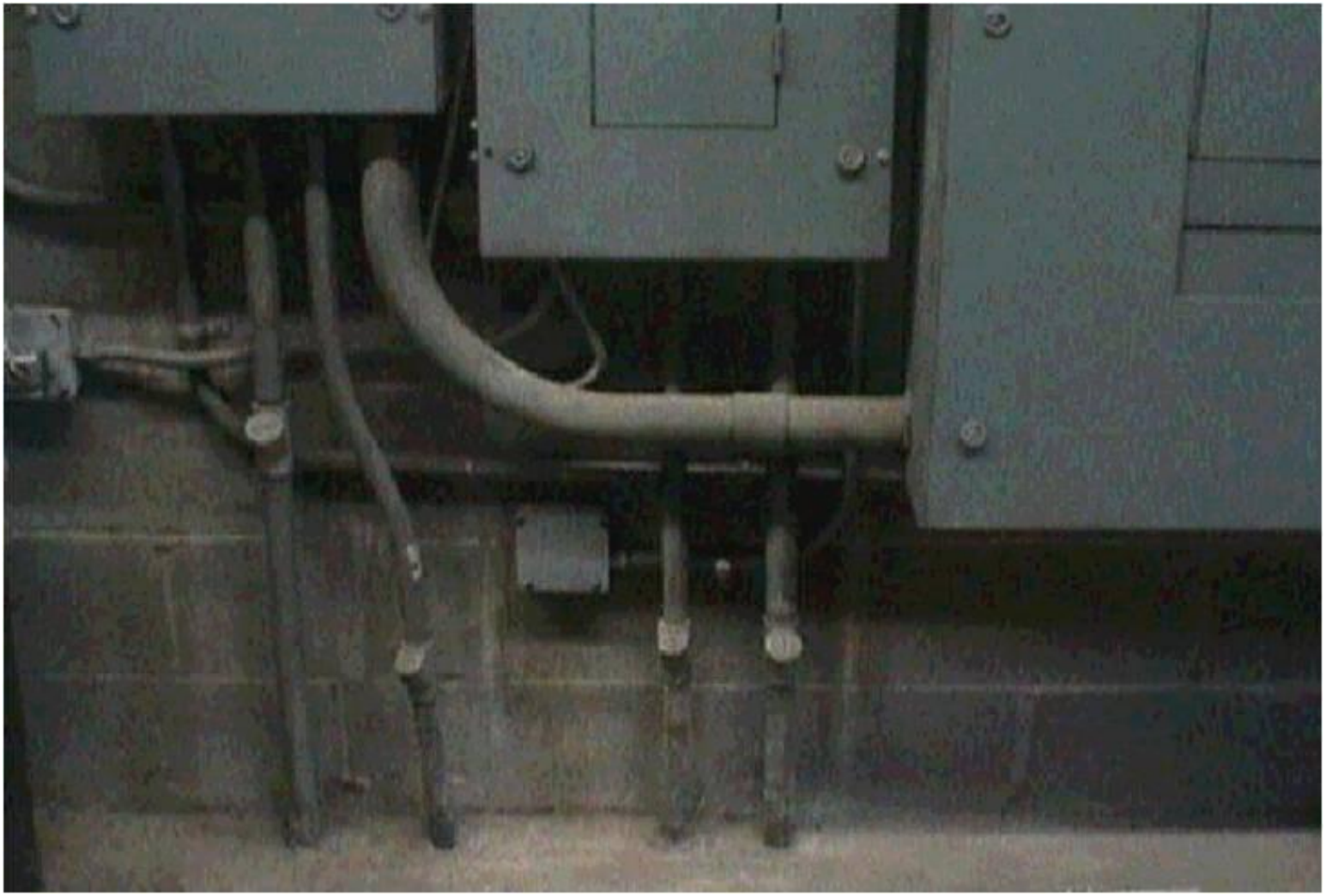

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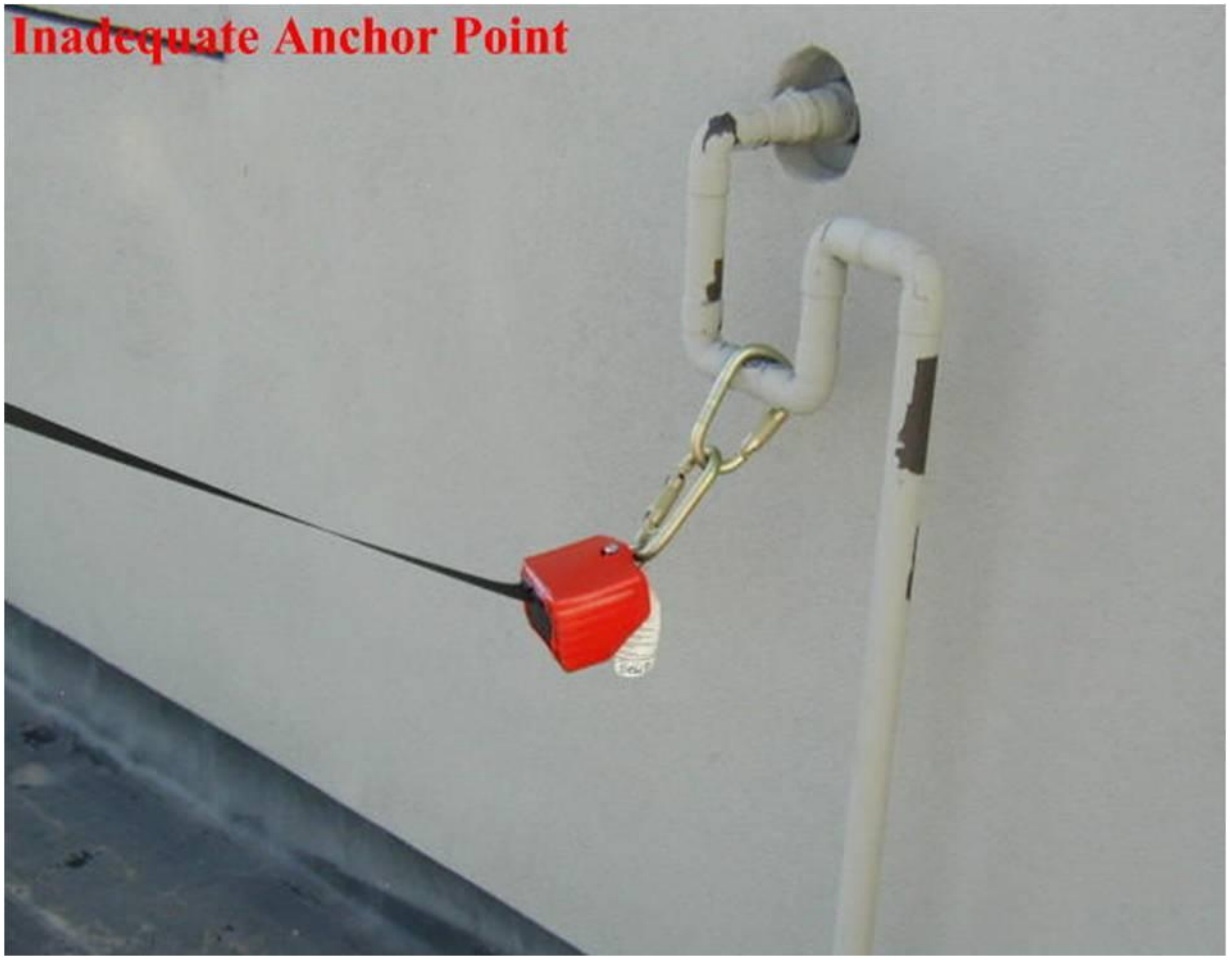

Anchorage Don’ts

Anchorage Don’ts

Anchorage Do's and Don'ts

Anchorage Do's and Don'ts

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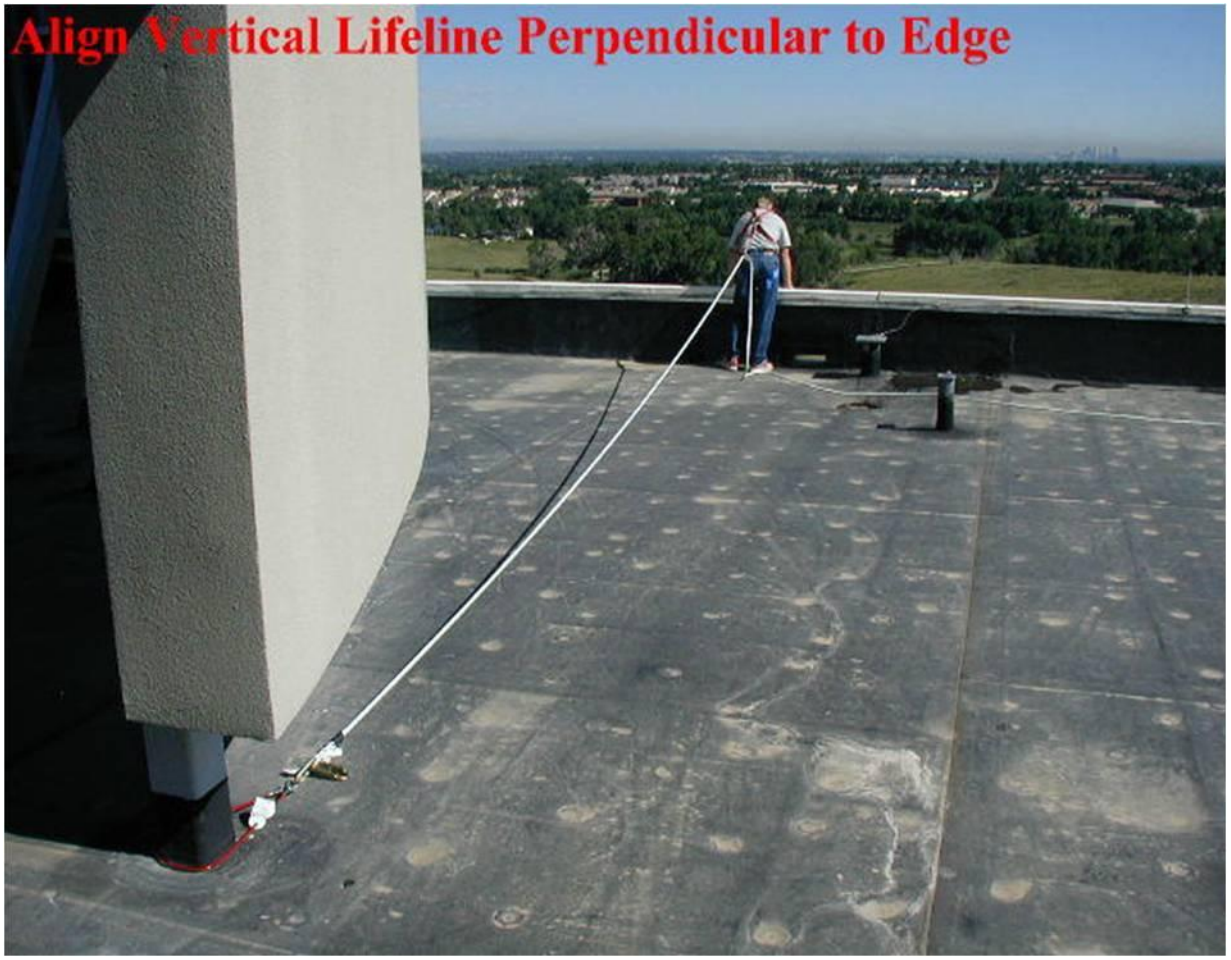
Anchorage Do's and Don'ts

Anchorage Do's and Don'ts

Use of Vertical Lifelines on Flat Roof Tops



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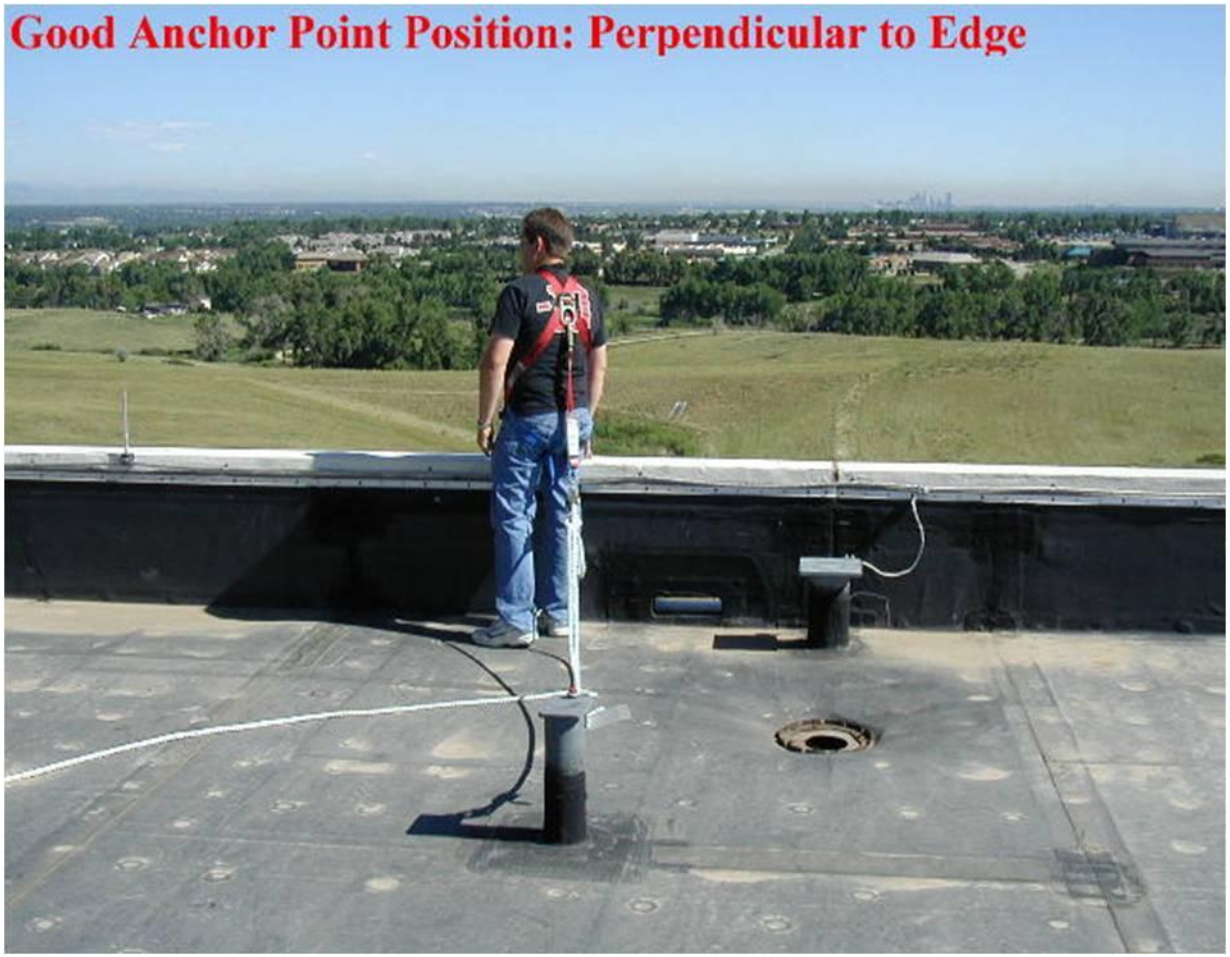

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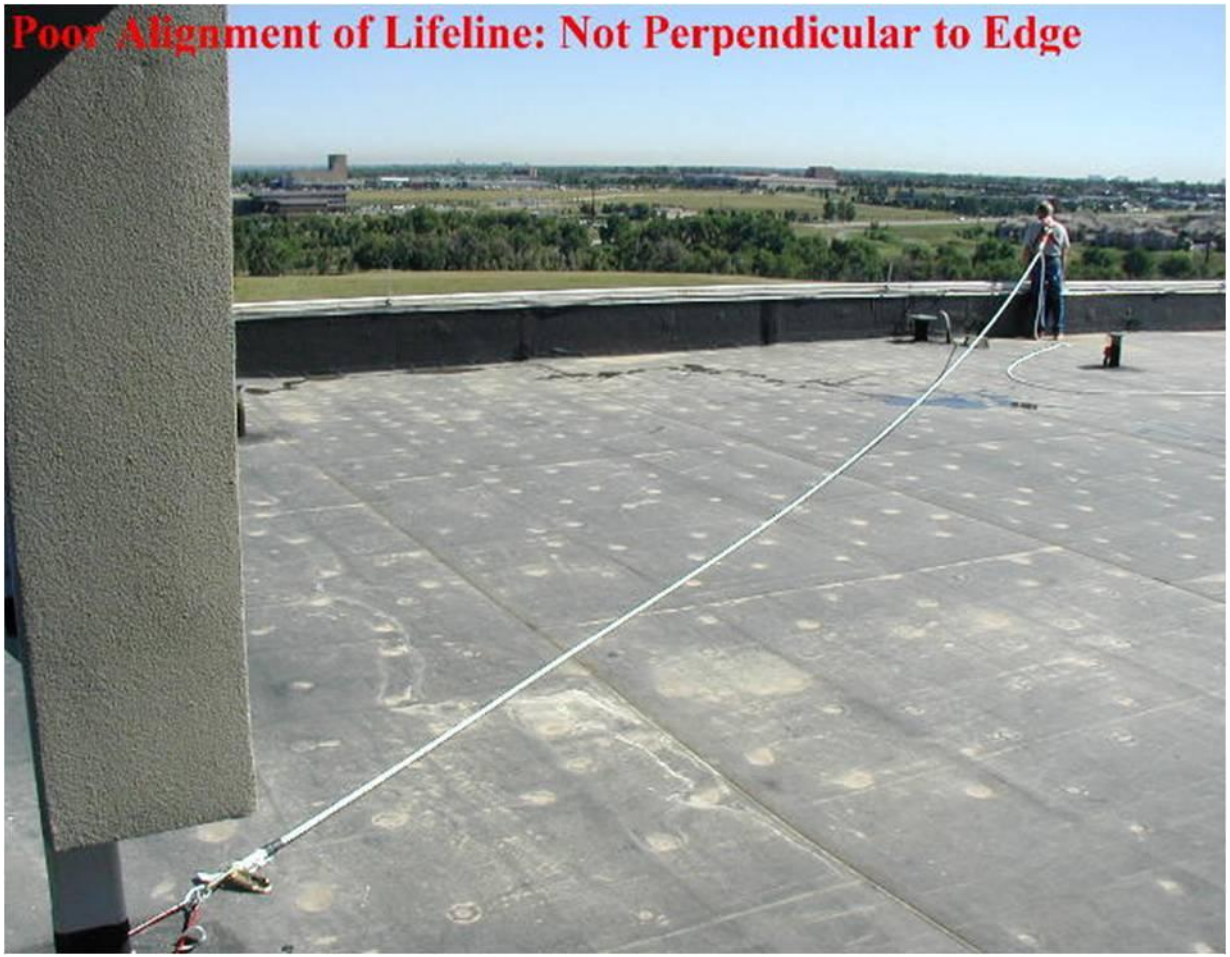


Use of Vertical Lifelines on Flat Roof Tops

Personal Fall Arrest System

Personal fall arrest systems used by any Alcatel-Lucent employee should:

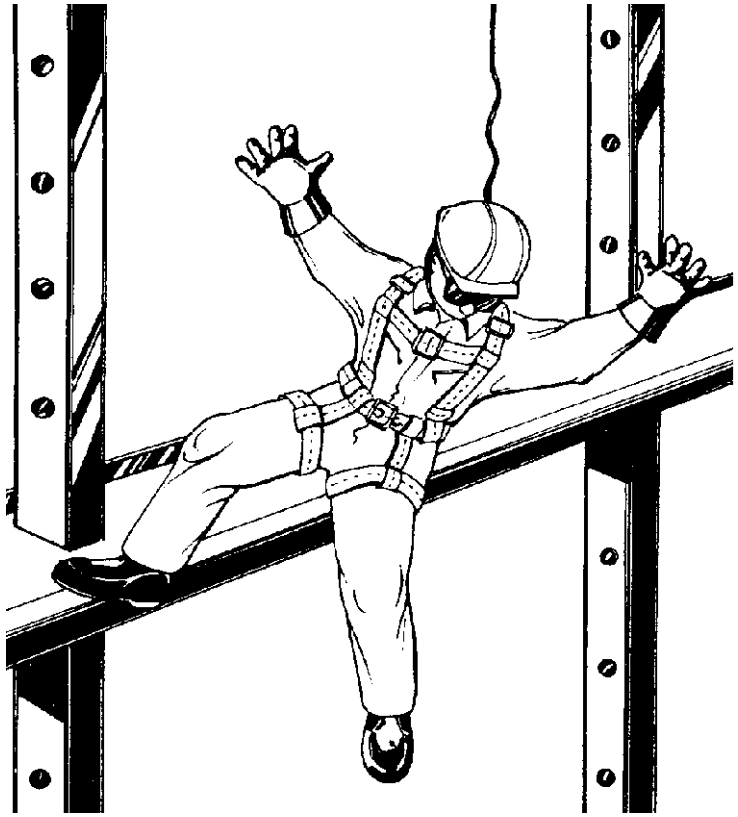
- Be inspected prior to each use.
- Have defective components removed from service.
- Be immediately removed from service and inspected for damage by the equipment manufacturer when subjected to impact loading.

The following steps must be taken prior to starting an operation that will require the use of Personal Fall Protection Equipment:

- Complete an Emergency Response Action Plan
- Contact the Regional EHS Manager

Impact Loading

Any system used to arrest a fall must not be used again without manufacturer's evaluation!



If Impact Loading Occurs

When a device is subjected to an impact load as in a fall, the following steps must be taken:

- Take it out of service
- Tag it with a “Do Not Use” label
- Write an incident report
- Contact your Alcatel-Lucent EH&S representative
- Send equipment to the manufacturer’s evaluation. Equipment components will be replaced in accordance with manufacturer’s advice.

Inspection

Thoroughly inspect all fall protection equipment prior to each use.

Inspect the following:

- Harness
- Webbing
- Stitching
- Buckles
- Lanyard
- Snap
- Webbing/Rope

Inspection

Inspect for the following:

- mildew, wear and damage
- cuts, tears & abrasions
- stretching
- cracked, broken or deformed D-rings & snap hooks
- contact with fire, acids or other corrosives
- ropes that show wear or internal deterioration
- any other damage or deterioration

Inspection Checklist

Lanyard

- Snaphook(s)
  - Gate Works Freely
  - Double Lock Works Correctly
  - Deformed
  - Corrosion
  - Rust
  - Chemical Exposure
  - Other
- Webbing/Rope
  - Cuts
  - Requires Cleaning
  - Abraded
  - Chemical Damage
  - Burned
  - Other
- Shock Absorbing Mechanism
  - Lanyard has sustained a shock load

Harness

- Webbing
  - Cuts
  - Requires Cleaning
  - Chemical Damage
  - Burned
  - Other
- Stitching
  - Cut
  - Broken
  - Burned
  - pulled
  - Missing Other
- Buckles
  - Deformed
  - Corrosion
  - Rust
  - Chemical Damage
  - Other

Inspection

Defective or damaged parts must be taken out of service immediately and tagged “unusable”.

The ALU EHS Organization shall formally inspect fall protection equipment at least annually.

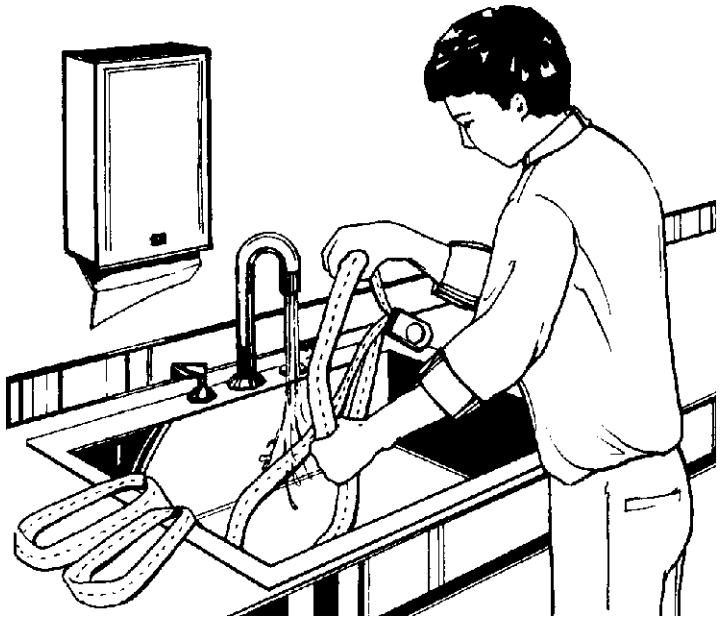
Incomplete or defective kits must be tagged and inspected again prior to use once components are replaced.

Maintenance and Storage

If needed, wash equipment in warm water with a mild laundry detergent.

Rinse thoroughly and allow to dry at room temperature.

Always follow the manufacturer's recommendations.



Maintenance and Storage

Store equipment in a clean area away from direct sunlight and extreme temperatures which could degrade the materials.

Other Considerations

- Always read instructions and warnings on any fall protection equipment.
- Make sure all equipment is compatible. DO NOT mix and match equipment from different manufacturers unless ALU EHS has approved the configuration.
- Develop an emergency response action plan for fall rescue emergencies establishing what to do if a fall occurs or the boom lift platform controls fail.
- Prolonged suspension from fall arrest systems can cause orthostatic intolerance, which, in turn, can result in serious physical injury, or potentially, death.

Rescue Options - General

Contact external emergency response services, Example: "911" in the U.S.

Rescue by co-workers

- Rescue pole/remote hook
- Controlled Descent Device
- Use of ladders or lift devices to reach the person
- Have extra people available to throw a rope to the person and help pull them to safety .

Self rescue

Rescue Options – Boom Lifts

The most common rescue option is to use the ground controls to lower the boom lift platform to the ground.

If that option does not work:

- Use a portable ladder or another aerial lift to reach the stranded worker(s).

Suspension Trauma / Orthostatic Intolerance

- "Venous pooling" occurs by the accumulation of blood in the veins while in a sedentary position.
- This condition causes orthostatic intolerance.
- Orthostatic intolerance may be experienced by workers that remain suspended in a harness after a fall.
- Fatalities resulting from orthostatic intolerance are referred as "harness-induced pathology" or "suspension trauma".

Rescue Procedures - Contingency Based Actions

Reduce risk of venous pooling

- Use footholds (loops) in vertical lifeline, placing feet on side of building to get thighs more horizontal or squeezing leg muscles to force blood flow.

Maintain continuous monitoring of suspended worker.

Ensure worker receives standard trauma resuscitation once rescued.

If unconscious, keep air passages open and obtain first aid.

Monitor worker after rescue, and ensure worker is evaluated by health-care professional.

Orthostatic Intolerance Signs and Symptoms

Signs and symptoms that may be observed in an individual who is approaching orthostatic intolerance:

- Nausea
- Dizziness
- Unusually Low Heart Rate
- Unusually Low Blood Pressure
- "Greying" or Loss of Vision
- Faintness
- Breathlessness
- Sweating
- Paleness
- Hot Flashes
- Increased Heart Rate

Suspension Trauma Risk Factors

Factors that can affect the degree of risk of suspension trauma:

- Inability to move legs
- Pain
- Injuries during fall
- Fatigue
- Dehydration
- Hypothermia
- Shock
- Cardiovascular disease
- Respiratory disease
- Blood Loss

Recommendations

- Rescue suspended workers as quickly as possible.
- Be aware that suspended workers are at risk of orthostatic intolerance and suspension trauma.
- Be aware of signs and symptoms of orthostatic intolerance.
- Be aware that orthostatic intolerance is potentially life threatening. Suspended workers with head injuries or who are unconscious are particularly at risk.

Recommendations

- Be aware of factors that can increase the risk of suspension trauma.
- Be aware that some authorities advise against moving the rescued workers to a horizontal position too quickly.
- Rescued workers should be kept in a kneeling position after rescue and gradually lowered over 30 minutes into a prone position unless a head injury prevents this action.

HANDS-ON EXERCISE - GUIDANCE

Each student will don each type of fall protection harness available that day and adjust it to fit properly.

Each student will demonstrate how to inspect another person to ensure their harness is correctly donned and adjusted.

Each student must have the opportunity to connect the rope grab to the lifeline and the short stop to another student's harness.

Donning, fitting and connecting kit's components will be done under the supervision of an ALU EHS Regional Manager.

SUBCONTRACTOR REQUIREMENTS FOR FALL PROTECTION

PM Role

- Overall, ensure all safety rules are being followed on the project
- Ensure Subcontractor has knowledge and training of Fall Protection Procedures
- Understanding the Local Emergency Response Action Plan - Fall Rescue Emergencies for their local working at heights Installation operations
- Periodically review the Subcontractor's Procedures when onsite

Subcontractor Role

- Conduct a Risk Assessment to identify hazards and need for Fall Protection
- Develop and document Emergency Action Plan (EAP) when using Fall Protection and make available to ALU upon request
- Use ALU EAP procedure Form if none available

QUESTIONS OR COMMENTS

This web based course shall be accompanied by a practical demonstration on how to use and maintain fall protection equipment per local legal requirements. Please contact your local EHS representative for further guidance.

- Contact:

  Your local EHS Coordinator for specifics and demonstration of use

- Regional EHS Leaders
- APAC - Ong Wee Liang
- CALA - Martha Montes
- EMEA - Robert Nolan
- NAR - Rich Quick

REMEMBER

No job is so important and no service is so urgent that we cannot take time to perform our work safely.

www.alcatel-lucent.com