

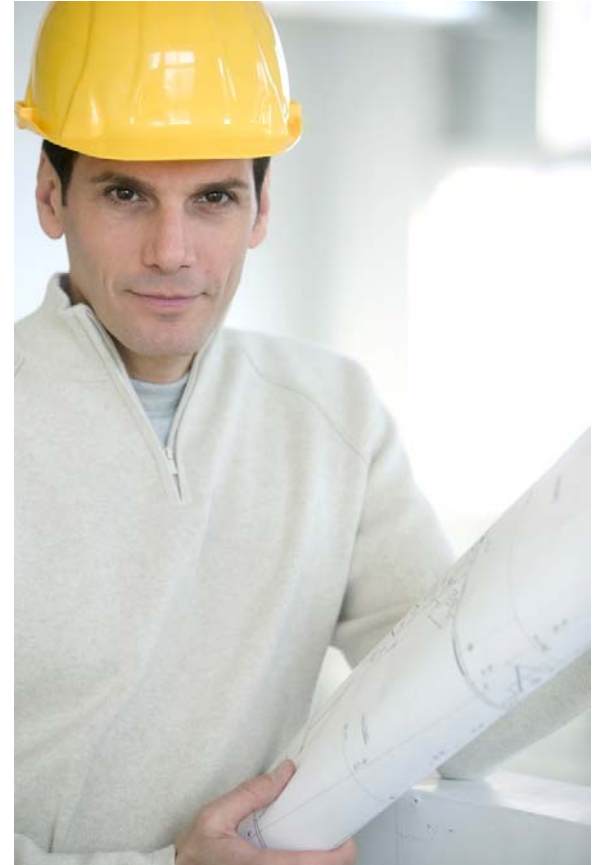


# **WELCOME...**

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## **...TO A SAFE WORKPLACE**

### **Roger Guy Baguley**





# Fall Protection

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3/24/2009

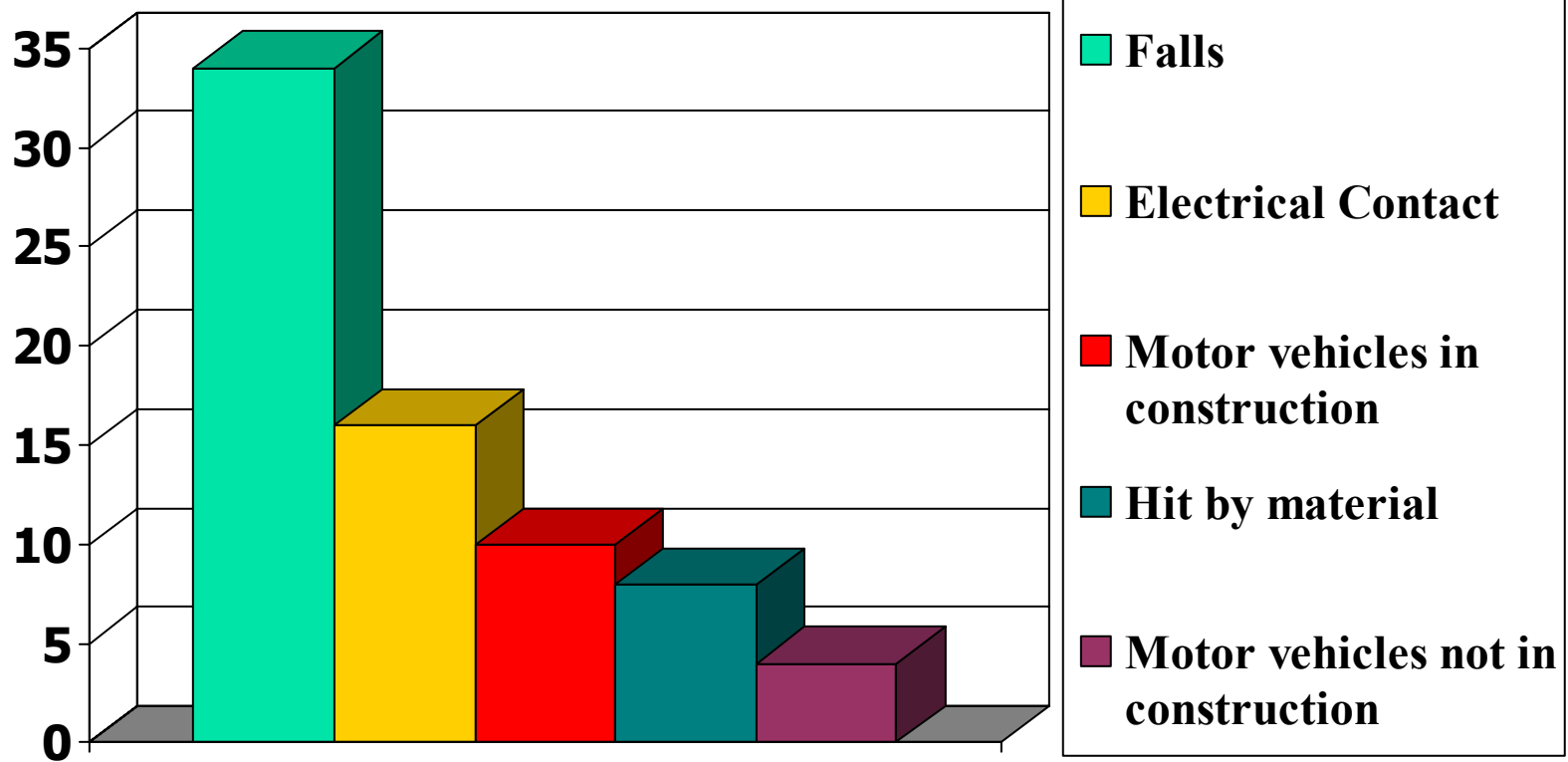


# Number One Fatality in Construction & Most Work Sites

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# **FALLS**

# Construction Fatalities 1996-2000





# Fall Protection

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## Agenda:

- ✚ Legal Responsibilities
- ✚ Basic Hazards and Controls
- ✚ Fall prevention
- ✚ Fall arrest



# General Legal Responsibilities

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- Occupational Health and Safety Act
- Regulations
- Others – Company/Plant H&S Policy



# Legal Responsibilities under the OH&S Act

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- Employer
- Supervisor
- Worker

# Duties and Responsibilities - Employers



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## The Employer must:

- appoint a competent person as supervisor
- provide information, instruction and supervision to a worker
- ensure that equipment, measures and protective devices provided are used as prescribed





## Employers must also ensure:

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- Equipment, materials and protective devices are provided
- Equipment, materials and protective devices are maintained in good condition
- Prescribed measures and procedures are carried out in the workplace, and
- Take every precaution reasonable in the circumstances to protect the worker.

# Duties and Responsibilities - Supervisors



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## The Supervisor must:

- Be a competent person
- Supervise at all times either personally, or through an assistant
- Ensure workers work in the manner, and with protective devices, measures and procedures required by the Act and regulations



## Supervisor must also:

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- Where prescribed, provide worker with written instructions as to the measures and procedures to take to protect the worker
- Take every precaution reasonable in the circumstances for protection of the worker
- Ensure that workers wear equipment, protective devices and clothing that the employer requires the worker to wear



# Duties and Responsibilities - Workers

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## The Worker must:

- use or wear the equipment, protective device or clothing that the employer requires the worker to wear
- report the absence or defect in any equipment or protective device which the worker is aware of and which may endanger the worker
- cannot remove or make ineffective protective devices required by the regulations



# Penalties

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- Individual - \$25,000 and/or one year in jail
- Corporation – \$500,000 and/or one year in jail



# Fall protection, when?

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- Falling more than 3 metres
- Falling more than 1.2 metres (wheelbarrow path)
- Falling into operating machinery
- Falling into water/liquid
- Falling into/onto hazardous object
- Falling through opening in work surface



# Fall Prevention

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- ✦ The best protection to prevent falls from happening in the first place.
- ✦ Fall prevention uses physical means to keep workers away from situations where they might fall.



# Fall Prevention

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- Ladders
- Scaffolds
- Powered Elevated Work Platforms
- Guardrails
- Protective Covers
- Warning Barriers or Bump lines
- Travel restraint systems





# Ladders - General

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- Not held, tied off, before use
- Rain, snow, ice or other slippery surface
- User fail to maintain three point contact
- Reaching or leaning too far out
- Ladders are setup on poor footing
- Areas at the base and top of ladders are not clear of obstructions, slippery substances, and other hazards



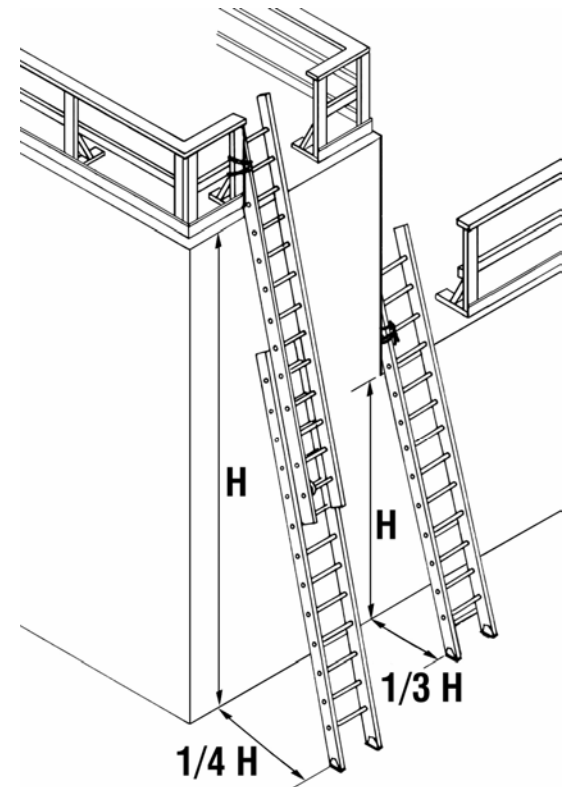
# Portable/Extension Ladders

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- Designed, constructed and maintained
- Free from loose, damaged, or defected rungs
- Safe distance from electrical conductors and equipment
- Erected one metre out for every three or four metres up

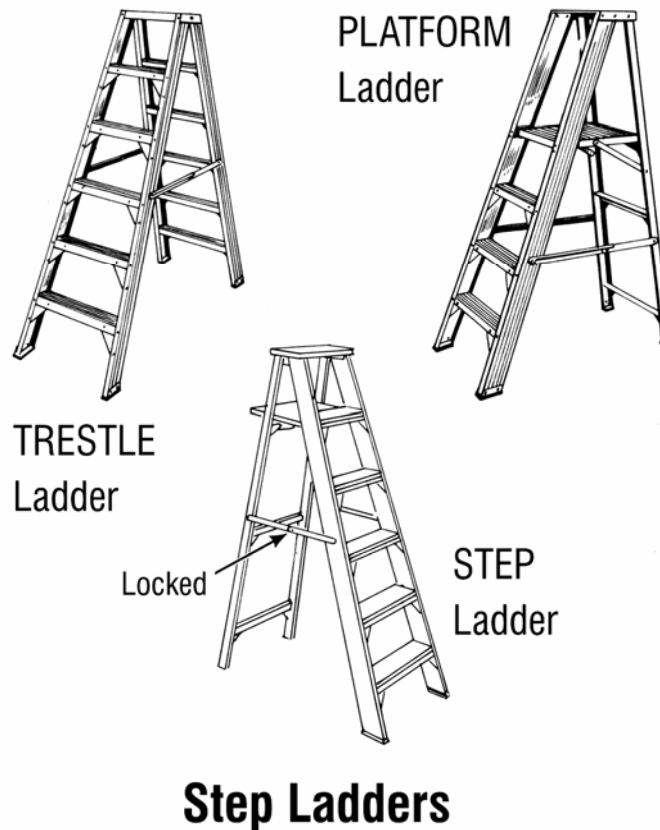
# Portable Ladders for Access

- Extend at least 900 millimetres above landing
- Clear space of at least 150 mm behind each rung
- Landing surface at top and bottom free obstructions
- Firmly secured at top and bottom to prevent movement



**Proper Ladder Angles**

# Stepladders



- Make the legs are fully open and spreaders pushed down and locked
- Never stand on the top step or pail shelf
- Use a stepladder that is the correct height for the job



# Fixed Ladders

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These include steel ladders permanently attached to buildings and other structures.

- ✓ Wall anchors are in good condition
- ✓ No excessive rust between rungs & side rails and wall brackets
- ✓ A ladders higher than 3 metres above grade is equipped with a safety cage or other means of fall protection



# Scaffolds

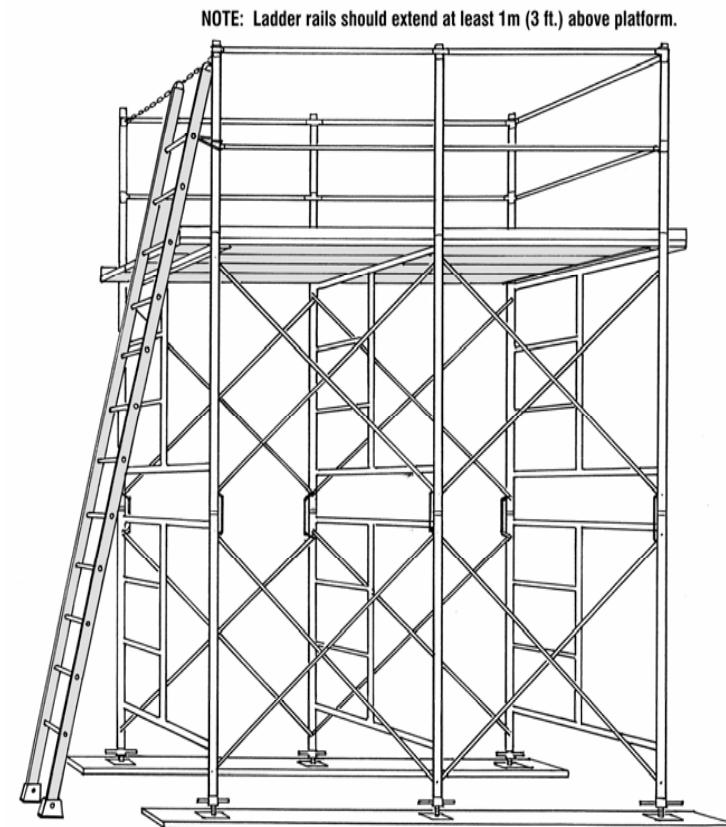
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Falls from scaffolds occur in connection with.....

- ◆ Erecting and dismantling
- ◆ Climbing up and down
- ◆ Platforms not fully planked
- ◆ Planks sliding off or breaking
- ◆ Lack of guardrails
- ◆ Failure to install all required components such as base plates, braces and clips

# Scaffolds work platforms

- Must be at least 460 mm wide
- Planks laid tightly side by side over the full width of platform
- No unguarded or unprotected openings
- Platform component secured to prevent slippage





# Powered Elevating Work Platforms - PEWPs

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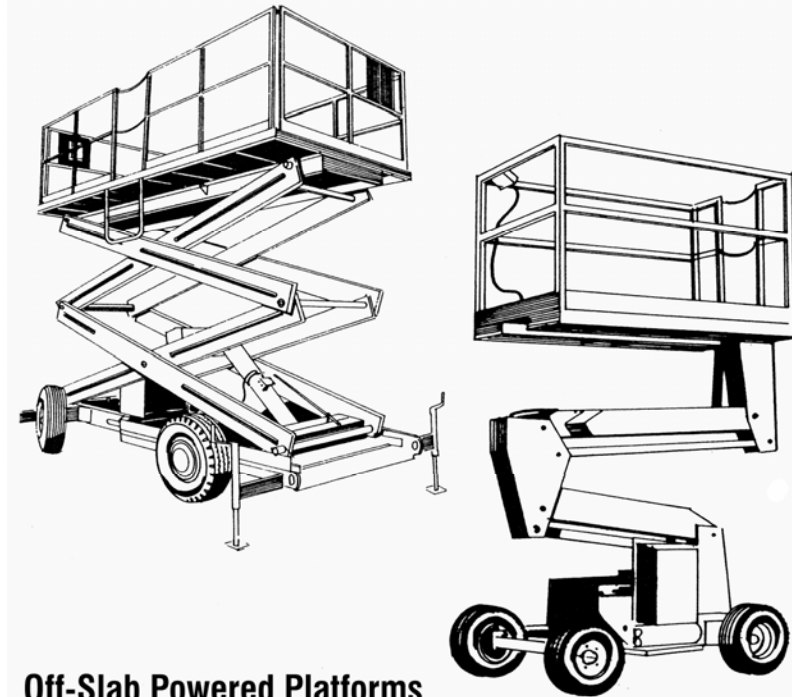
Fall protection for powered elevating work platforms minimum requirements.

- ◆ PEWPS must be equipped with guardrails
- ◆ The PEWPS must not be moved with workers aboard unless each worker wears a full body harness adequately tied off to the platform



# Powered Elevating Work Platforms

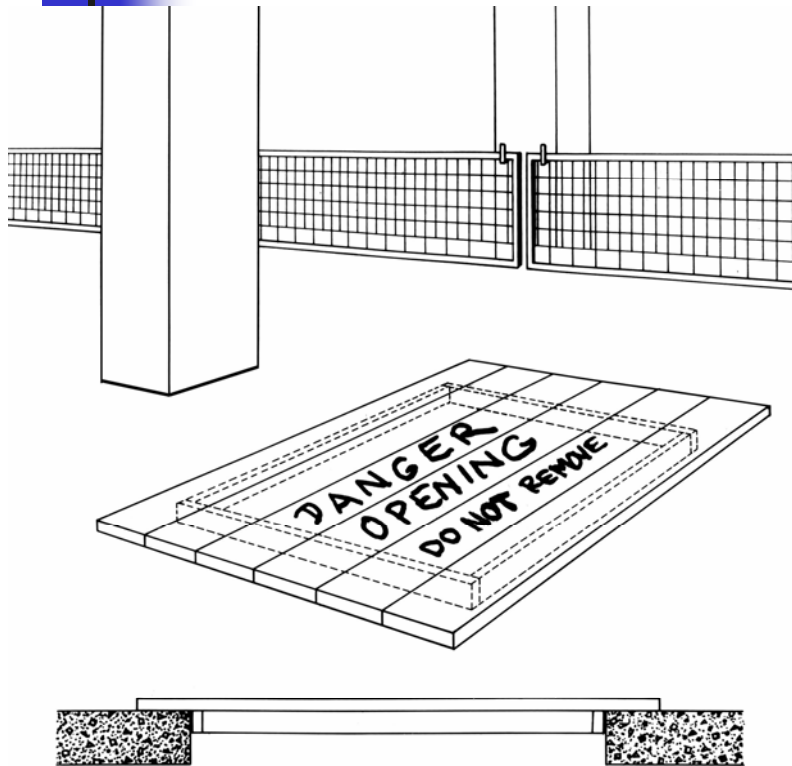
- Always operate PEWPs on a firm a level surface
- Before using the equipment, inspect the work area for overhead power lines and other electrical hazards
- Also inspect the work area for hazards such as grade changes, curbs or drop-offs



Off-Slab Powered Platforms



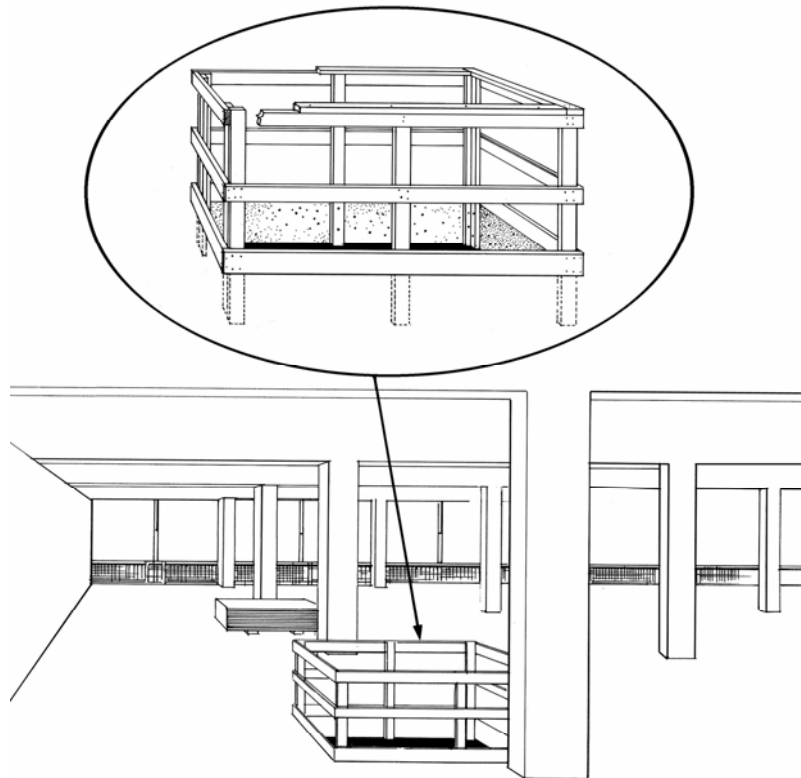
# Protective Covers



**Pallet-Style Cover**

- Completely covers opening
- Securely fastened together as well to the sides of the opening
- Clearly identified as a cover
- Constructed of a material adequate to support all expected loads

# Protection for Floor Openings



A guardrail can also be used as protection around openings in floors and roofs

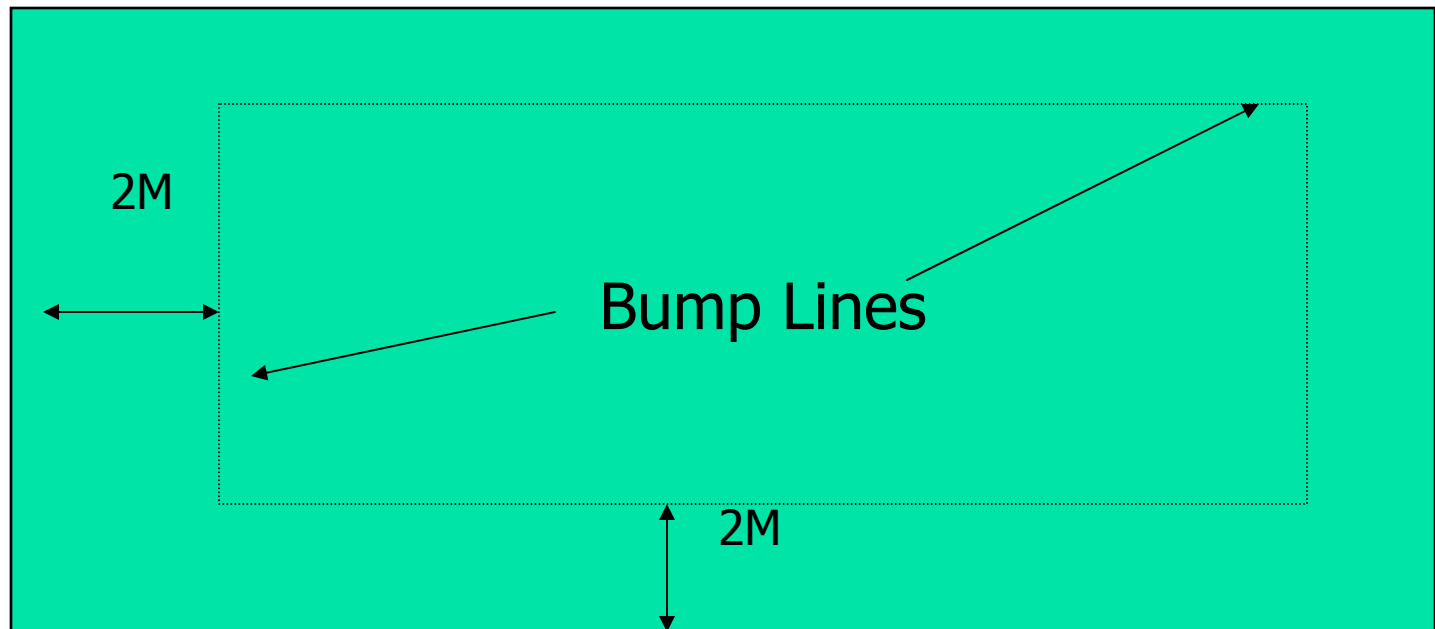
**Protection for Floor Openings**



# Barriers or Bump lines

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Roof





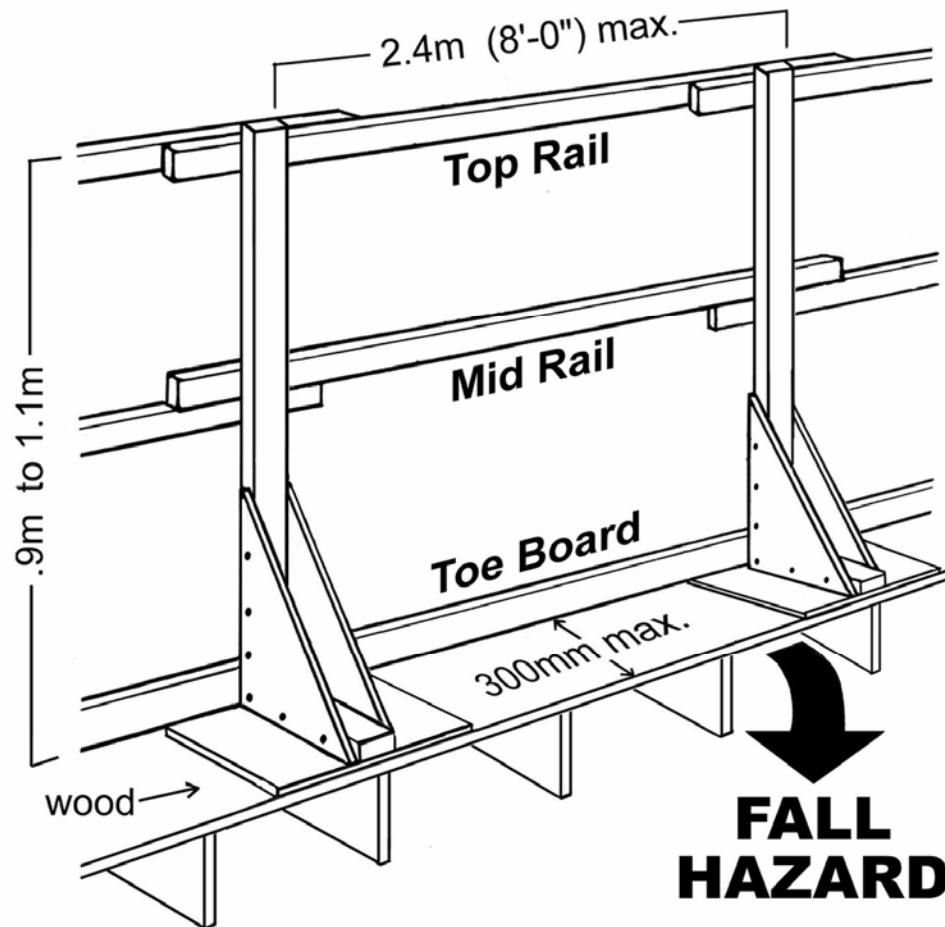
# Guardrails

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A worker at risk of falling more than 3 metres must be protected by a fall arrest system, travel restraint system, or a guardrail system.

In most cases, guardrails are the most common and convenient means of fall protection.

# Guardrails

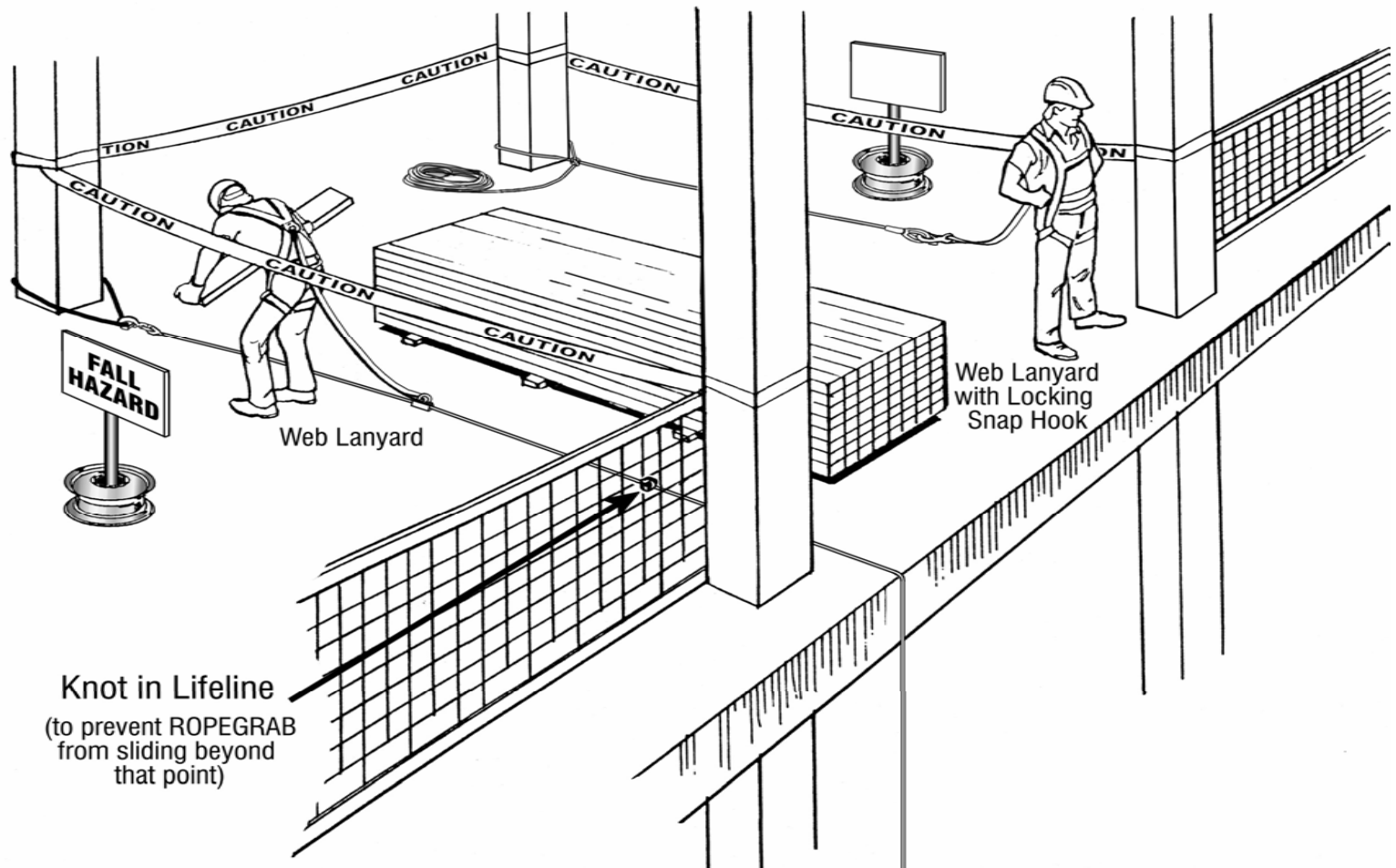


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Typical Dimensions for Guardrails



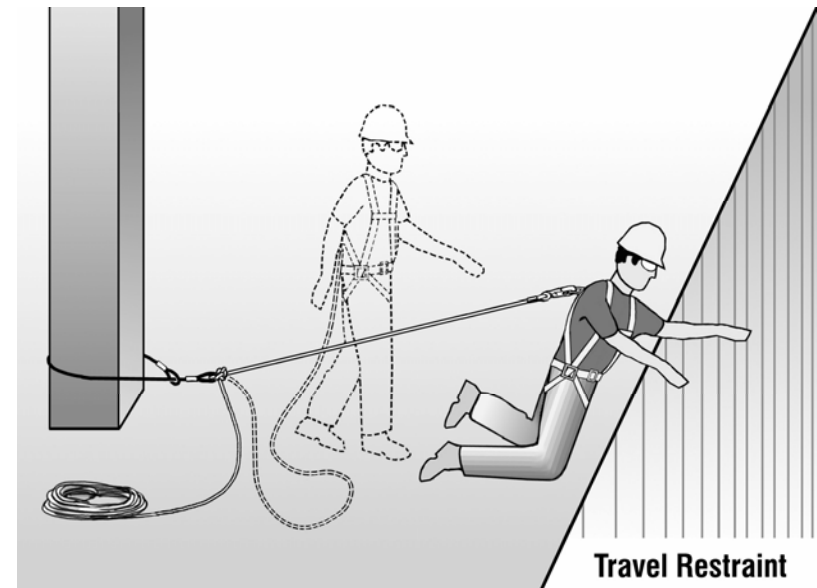
# Guardrails – Temporary Removal





# Travel Restraint

- Defined: Prevents workers from a fall hazard
- Anchor support of 2 kilonewtons(450 pds)
- Support a right angles of fall hazard
- Lifeline is adjusted to prevent worker fall





# Fall Systems

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- Fall Arrest
- Fall Restricting



# Fall Arrest

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Where workers cannot be protected from falls by guardrails or travel restraint, they must be protected by a least ....

- ▶ Fall-restricting system
- ▶ Safety net
- ▶ Fall-arrest system



# Fall Restricting Systems

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- Maximum free fall distance 0.6 metres (**2ft**)
- Anchor support must support a static load at least 6 kilonewtons(1350), SF of 2
- If a worker falls more that 0.6 metres the system shall be removed and be retested before re-use.
- Examples: towers, fixed ladders.



# Fall – Arrest System

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- Must include a CSA-approved full body harness
- A lanyard equipped with a shock absorber unless the shock absorber could cause a falling worker to hit the ground
- Attached to a lifeline or by the lanyard to an adequate fixed support
- Prevent a falling worker from hitting the ground or any object below the worker
- Must not subject the worker to a peak fall-arrest force greater than 8 kilonewtons

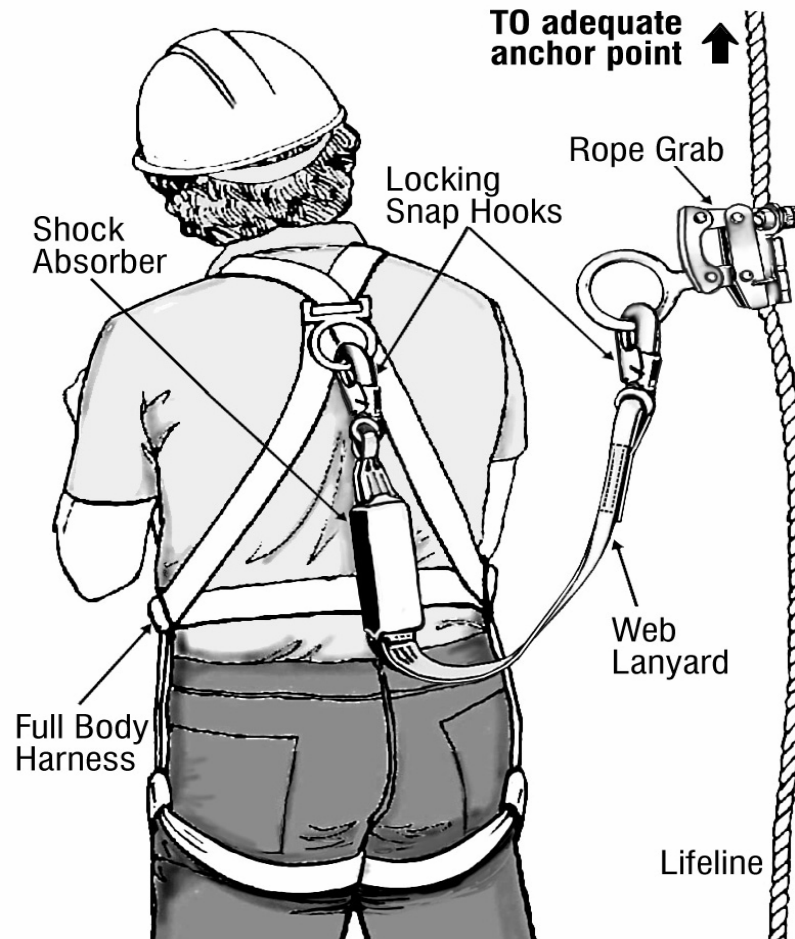


# Fall Arrest Components

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- Anchor point
- Lifeline
- Rope grab
- Lanyard
- Shock absorber
- Harness
- Hardware

# Full Body Harness and Fall Arrest System



**Full Body Harness and Fall Arrest System**



# Anchor points

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- Shall be able to support a static force of at least 8 kilo newtons (1800 pounds) without exceeding the allowable unit stress for each material used
- With shock absorber, 6 kilonewtons (1350 pounds)
- Avoid pendulum effect
- Close to 90 degrees of work





# Anchor Points

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## ■ **USE:**

- Large HVAC units
- Floor columns
- Designed tiebacks
- Mechanical rooms
- Masonry chimney (large)
- Pipe anchorage (large diameter 12")

## ■ **DON'T USE:**

- Roof vents
- Vent pipes
- Ductwork
- Metal chimney
- TV Antenna
- Satellite dish
- Balcony railings



# Lifelines

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- 1) Vertical
- 2) Horizontal
- 3) Retractable



# Lifelines - Inspection

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- **Protect lifelines from:**

- Ultraviolet light
- Heat
- Friction
- Sparks
- Chemicals



# Vertical Lifelines

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- Only one person at a time may use a vertical lifeline
- A vertical lifeline must reach the ground or a level ground where the worker can safely exit
- Vertical lifelines are 16 mm in dia.  
polypropylene blends

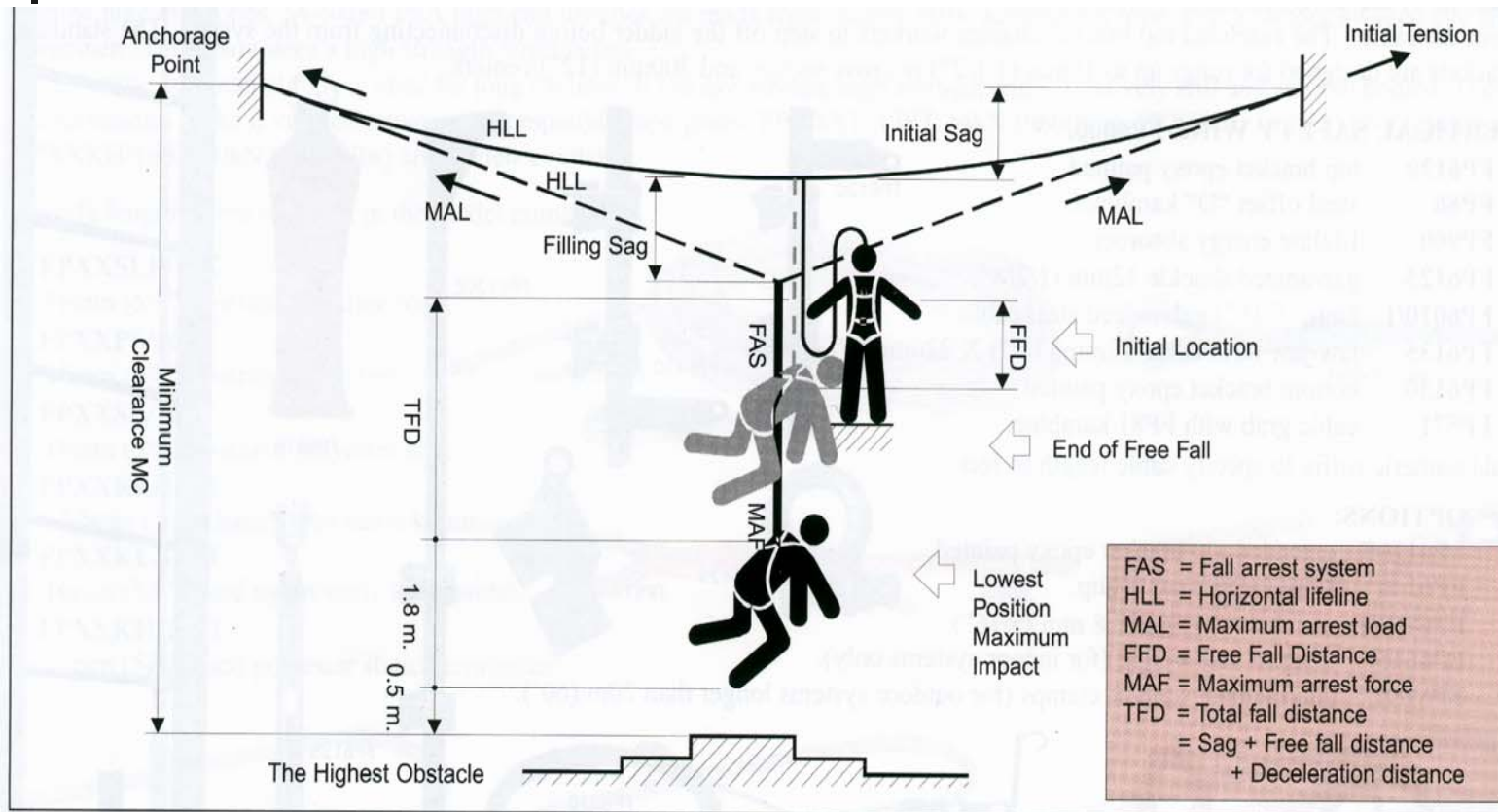


# Horizontal Lifelines

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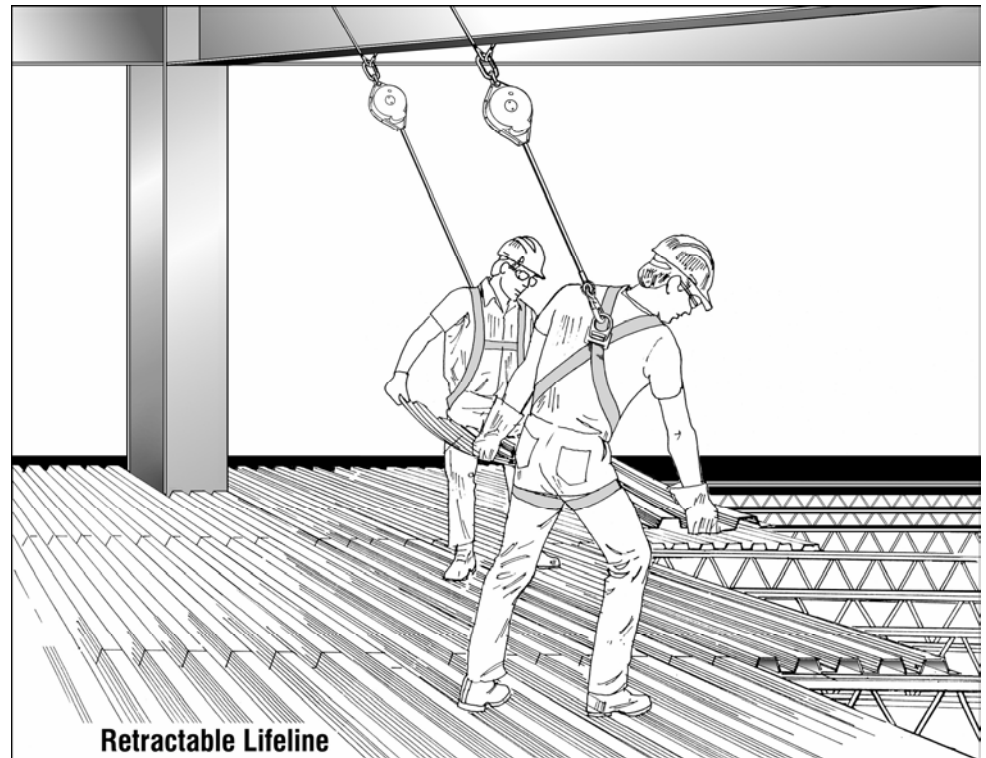
- Designed by a professional engineer
- Inspected before each use by professional engineer or competent worker
- Design drawings kept on site

# Horizontal Lifelines



# Self Retracting Lifelines

- Inspect before use
  - Lifeline
  - Body
  - Connecting devices
  - Brake
  - Inspection date

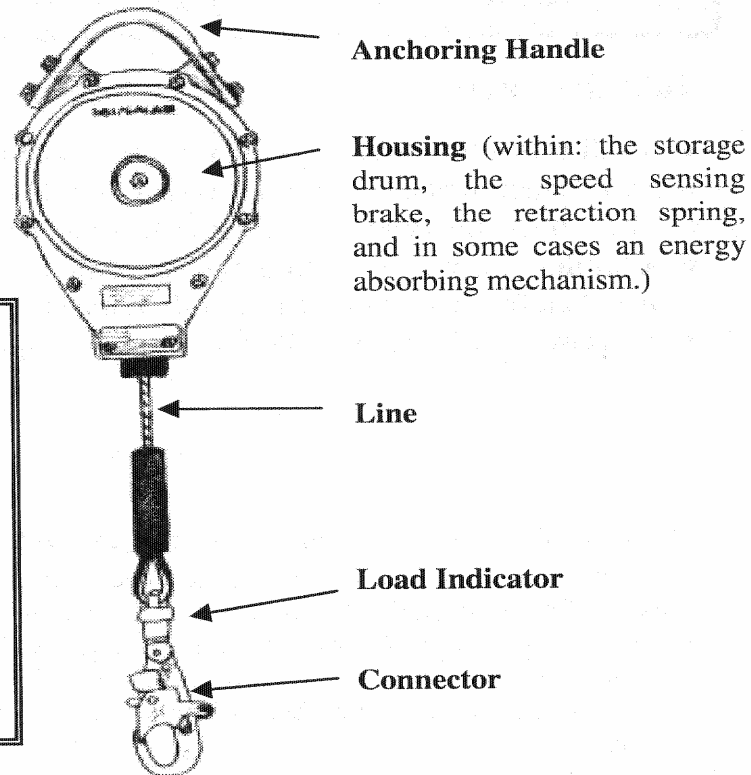


# Self Retracting Lifelines

**Components:** SRLs are made up of a number of working components, which may include:

## **EQUIPMENT ↗ HIGHLIGHT**

*The DBI Z3400 Series SRL is an environmentally sealed unit with a reserve lifeline and load indicator. This device limits the fall arrest force to 900 lbs. or less. Some models can be fit with a retrieval mechanism to aid in rescue. Units range in length from 50 to 130 feet.*





# Self Retracting Lifelines





# Lanyards

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- **Inspect before use**

- Webbing, loose or broken stitching
- Snap hooks
- Shock absorber
- Burns, cuts, or signs of chemical damage
- Frayed web material



# Shock Absorbers

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- **Inspect before use**

- Connectors
- Tag
- Jacket

One end of the shock absorber must be connected to the D-ring on the full body harness.



# Full Body Harness

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- **Inspect before use**
  - Webbing
  - D-ring
  - Keeper pad
  - Grommets and buckles



# Hardware

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- **Caribiners, snap hooks, rope grabs**
  - **Inspect before use**
    - Ease of action
    - Bent keeper
    - Distorted body
    - Rust
    - Wear in metal

# Caribiners



# Fall Distance

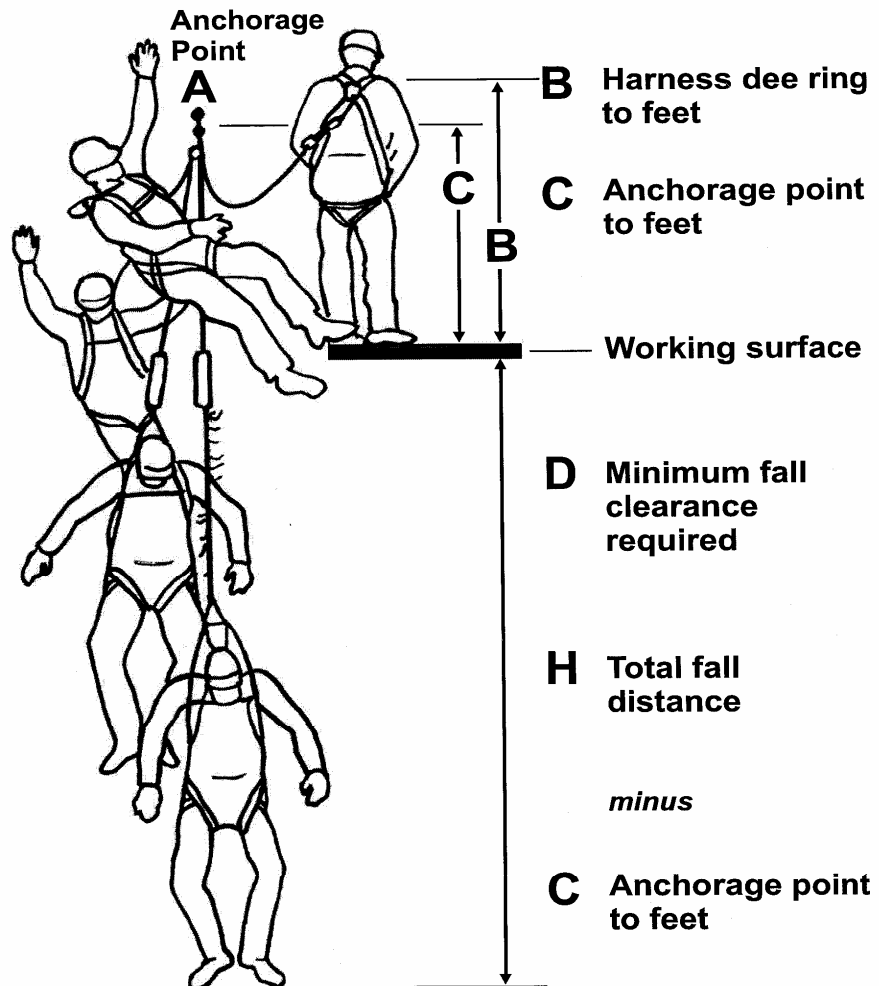
**H** TOTAL FALL  
DISTANCE EQUALS  
 $E + F + G + B$

**E** Length of lanyard  
free fall - varies due  
to length of lanyard,  
slack and height of  
anchorage point

**F** 3.5 ft. (1.06 m) shock  
absorber extension  
(max.)

**G** 0.5 ft. (15.24 cm)  
dee ring slide

**B** Harness dee ring to  
feet





END

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