



# Fall Protection Systems

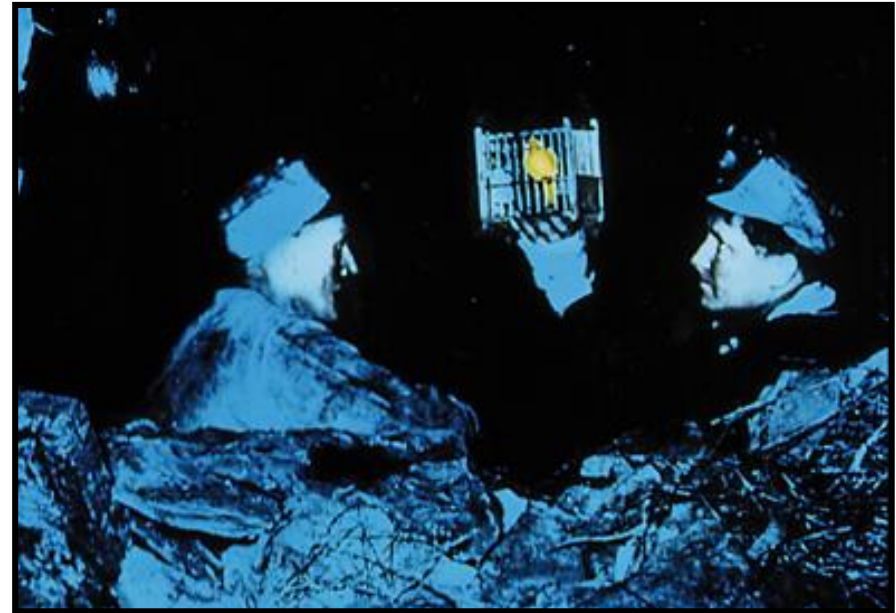
*ND, SD, MT Territory Sales Manager  
Andy Speidel*



- History about MSA/Latchways
- ANSI / OSHA / Implementation of FP
- Components of the Fall Arrest System
  - Calculation of Fall Distance
  - Fall Arrest vs Fall Restraint
  - Suspension Trauma
  - Inspection Protocol
  - ANSI Updates
- OSHA 1910 Walking and Working Surfaces Update
  - Background
  - Fixed ladders and Vertical Systems Solutions
  - Roofing
  - Training

# History of MSA / Latchways

- Mine Safety Appliances founded in 1914
- Largest manufacturer of safety products worldwide
- Publicly traded since 2004
- International presence
- Latchways founded in 1974
- MSA acquired Latchways 2015



# Manufacturing Facilities

- Corporate Office - Pittsburgh, PA
- Manufacturing:
  - Cranberry, Murrysville, PA
    - Hard Hats, Portable Instruments, SCBA
  - Jacksonville, NC
    - Respirators, Cartridges, HH Suspensions
  - Englewood, CO
  - Queretaro, Mexico
  - Devises, UK
    - Fall Protection
    - Engineered Systems







- ANSI
  - American National Standards Institute
  - Think – Local Government
- OSHA
  - Occupational Safety and Health Admin
  - Think – Local Law Enforcement
- Implementing FP
  - General Industry - 4'
  - Construction - 6'
  - MSHA - Fall potential

**1**

## **ELIMINATION OR SUBSTITUTION**

Eliminating a hazard by lowering the worksurface to ground level, or substituting a process, sequence or procedure so that workers no longer approach a fall hazard.

**2**

## **PASSIVE FALL PROTECTION**

Isolating or separating the hazard or work practice from workers through the use of guardrails or by covering exposed floor openings.

**3**

## **FALL RESTRAINT**

Secures the worker to an anchor using a lanyard short enough to prevent the worker's center of mass from reaching the fall hazard.

**4**

## **FALL ARREST**

Includes systems designed to stop a worker's fall after a fall has begun.

# ABC's of Personal Fall Arrest Systems

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- A) Anchor Point
  - 5000 lb+ rating
  - Qualified Person or Structural Engineer
  - RTM – Read...The...Manual
  
- B) Body Harness
  - Types – Vest or Crossover
  - Body Belt vs Chest+Waist Harness vs Full Body Harness
  - Proper donning is a key to safety
  - Harness selection for appropriate application
  
- C) Connecting Device
  - Shock Absorbing Lanyard
  - Self-Retracting Lanyard



# Anchorage Connectors



- Snaphooks
- Carabiners
- Swivel D-Rings
- Roof Anchors
- Anchor Straps
- Cable Straps
- Beam Grips
- Beam Trolley
- Constant force post



- Type
  - Vest
  - Crossover
- Industry Application
  - Construction
  - Welding / Arc Flash
  - Oil / Gas / Petrochem

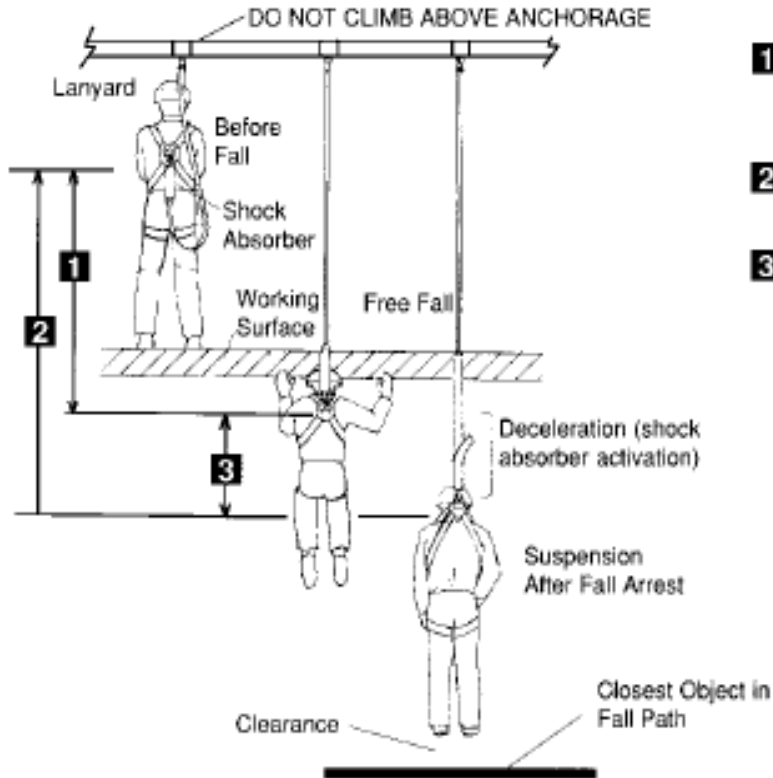
# Connecting Device



- Shock-Absorbing Lanyard
  - Internal / External
  - Tie-Back
  - Welding
  - Arc Flash
- Self-Retracting Lanyard
  - 400 lb capacity
  - Brake-Mechanism
- FAF <900 lbs



# Calculation of Fall Distance



- 1** Free fall distance. Limited to 6 ft (1.8 m) by OSHA and ANSI Z359.1. Limited to 5 ft (1.5 m) by ANSI A10.14 and Canadian regulations.
- 2** Total fall distance. The sum of the free fall distance and deceleration distance.
- 3** Deceleration distance. Must not exceed 3.5 ft (1.1 m).

(Illustrations not to scale.  
Details not shown.)

## ■ Alternate Calculation

- D-Ring to Ground – 6'
- Lanyard Length – 6'
- Shock-Absorber Deployed – 3.5'
- Safety Factor – 2.5'

## • Define Variables

- Freefall Distance
- Deceleration Distance
- Vertical Elongation
- Harness Effect
- Safety Factor

## • Solutions

- Reduce lanyard length
- Raise anchor point
- Implement SRL

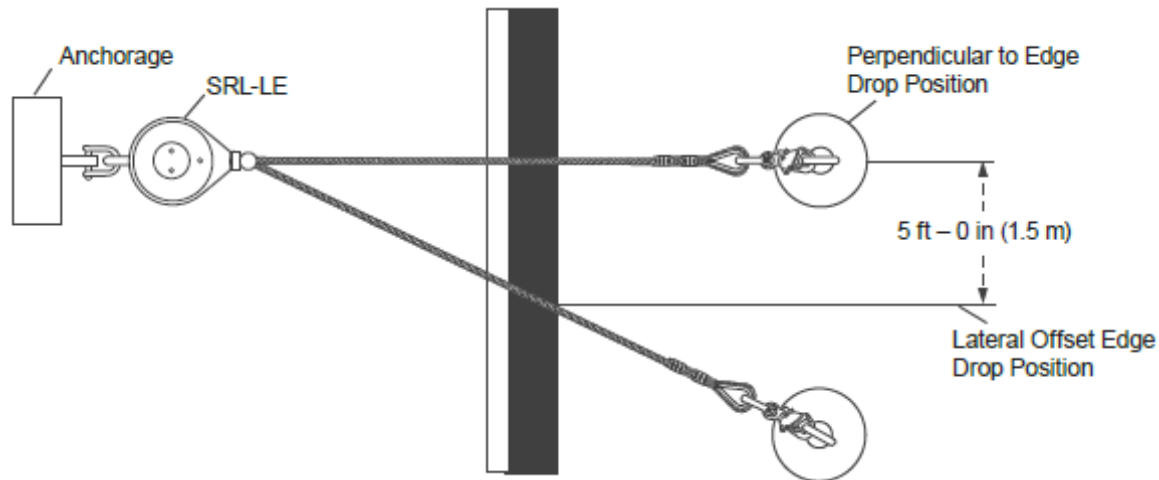
# Self-Retracting Lanyards



- SRL's and PFL's
  - <18' Solution
  - <24" TFD (Class A)
  - <54" TFD (Class B)
  - Integral Energy Absorbers
  - Cable / Web
  - plastic / Steel Housing
  - Various lengths to meet needs
  - Swing-Fall Hazard
  - Leading Edge

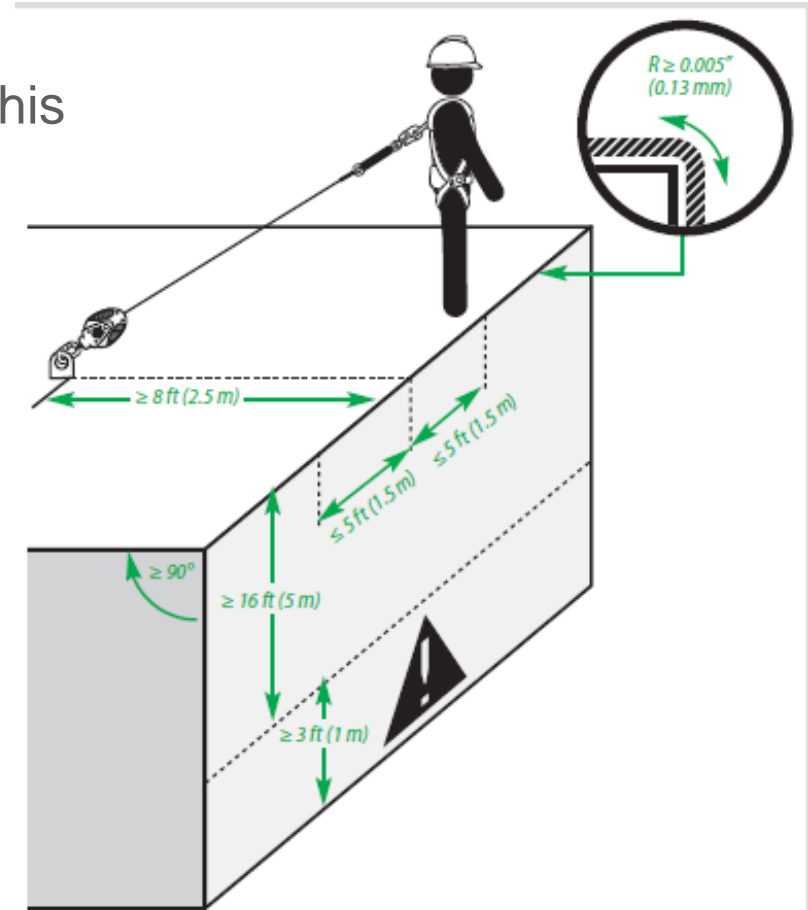
# ANSI Z359.14 (SRL-LE): Leading Edge

- ANSI Z359.14-2012 defined leading edge SRLs or SRL-LE
  - “The line of the SRL-LE’s shall include an integral energy absorber element adjacent to the end of the line which connects to the body support”
- SRL-LEs are tested perpendicular to the edge (200), and with an offset over a sharp edge(382) ( $r=0.005\text{in}$ ) as well as a final static pull test (1000)



# Limitations of Leading Edge SRL

- Additional fall clearance when used at ground level
  - Refer to the product manual as this could vary
- Swing Fall Hazards



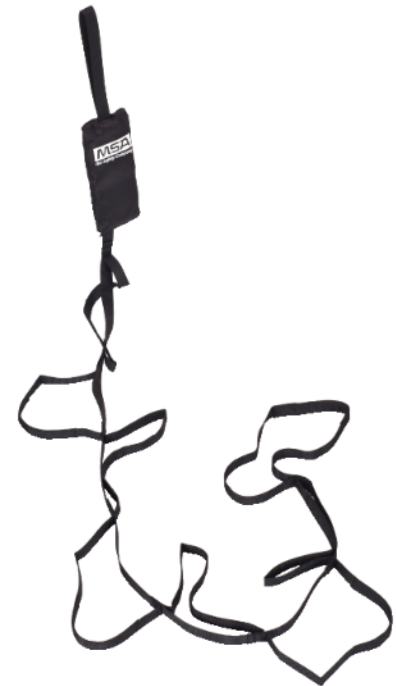


# Fall Arrest vs Fall Restraint

- **Fall Restraint**
  - Anchor Point
  - Body Belt or Full Body Harness
  - Restraint Lanyard
  - No shock-absorber needed
- **Fall Arrest**
  - Anchor Point
  - Full Body Harness
  - Shock-Absorbing Lanyard
    - Limit fall arrest forces <1800 lbs per OSHA (<900 lbs per manufacturer)

FP System	Certified Anchor	Non-Certified Anchor
Fall Arrest	2x Max Arresting Force	5000 lbs
Work Positioning	2x Foreseeable Force	3000 lbs
Fall Restraint	2x Foreseeable Force	1000 lbs
Rescue	5x Applied Load	3000 lbs
Horizontal Lifeline	2x Max Line Load	N/A

- Definition: A natural human reaction to being upright and immobile, where a complex combination of blood pooling in the legs and cardiorespiratory restriction leads to unconsciousness. Also called orthostatic intolerance.
- Potential consequences of suspension:
  - Dizziness
  - Nausea
  - Loss of consciousness
  - Limb tingling, numbness
  - Difficulty breathing
  - Blood Clots / Toxicity



# Inspection Protocol

- Frequency?
  - Annually vs Bi-Annually
  - Competent Person
  - Inspection Certified
- Responsibility?
  - Employer
  - Individual
- Documentation?
  - Manufacturer-issued documentation
  - OSHA
- Equipment Failure?
  - Remove from service
  - Destroy to prevent future use





- Identification of Equipment Failures
  - Wear
  - Cuts / Frayed Edges
  - Damaged Grommets
  - Burns
  - Torn Stitches
  - Distorted Hardware

# 5 Areas of Inspection

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## 1. Labels

- Remove if missing / illegible
- If missing—remove from service temporarily. Contact manufacturer. Will send a new label and zip-tie.

## 2. Metal Components

- Rust, bent or broken parts compromises structural integrity

## 3. Plastic Components

- D-Shim, Keepers, Webbing termination tabs

## 4. Fabric Components

- Torn webbing or stitching
- Inspecting with hands vs eyes aids in locating issues

## 5. Stitching

# Formal Inspection - Harness

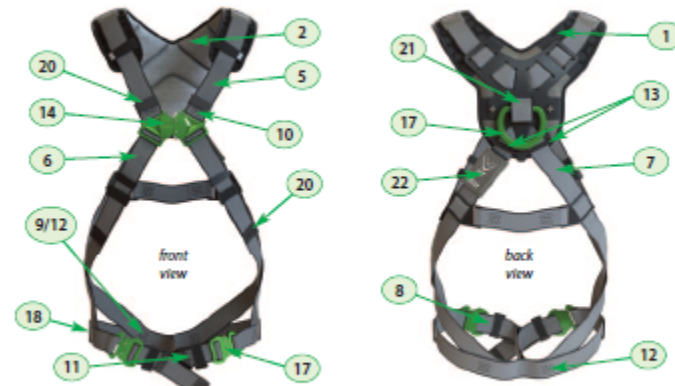
## MSA Harness Inspection: V-FIT™ Harness

Name		Clock No.	
Model No.	Serial No.	Manufacture Date	
Inspector's Name	Inspection Date	DISPOSITION (Check One) PASS FAIL	

### Inspection Procedure

- Inspect all webbing (straps) and stitching for cuts, fraying, pulled or broken threads, abrasion, excessive wear, altered or missing straps, burns, UV damage, and heat and chemical exposures.
- Inspect all parts for deformation, cracks, corrosion, deep fitting, burrs, sharp edges, cuts, nicks, exposure to excessive heat or chemicals or other damage. Check for missing, loose or improperly functioning parts.
- Inspect buckles.
  - Secure-Fit Buckle (if present): Make sure both locking tabs engage fully and operate smoothly.
  - Quick Connect Buckle (if present): Make sure both pawls are engaged and operate smoothly.
  - RaceFLEX (if present): Make sure both pawls are engaged and operate smoothly.
- Inspect all labels. Labels must be present and legible.

FORMAL INSPECTION LOG					
ITEM	DESCRIPTION	QTY/ UHS	CONDITION CODE(S)	OVERALL ASSESSMENT	COMMENTS
<b>Fabric Components: Optional Padding</b>					
1	Shoulder Pad—Exterior Fabric	N/A			
2	Shoulder Pad—Interior Fabric	N/A			
3	Leg Pads—Exterior Fabric (if applicable)	N/A			
4	Leg Pads—Interior Fabric (if applicable)	N/A			
<b>Fabric Components: Webbing</b>					
5	Shoulder Straps (above chest buckle)	2			
6	Torso Straps—Front (below chest buckle)	2			
7	Torso Straps—Back (below shoulder pad)	2			
8	Leg Straps	2			
9	Subpelvic Strap	1			
<b>Fabric Components: Stitching</b>					
10	Chest Buckle Stitches	2			
11	Leg Buckle Stitches	2			
12	Subpelvic Stitches	2			
13	Load Indicators	2			
<b>Metal Components: D-Rings</b>					
14	Chest Buckle	1			
15	Tongue Buckle Legs	2			
16	Quick Connect Legs	2			
17	Back D-Ring	1			
<b>Plastic Components</b>					
18	Leg Web Finales	2			
19	Chest Web Finales	2			
20	Lanyard Keepers	4			
21	PFL Connector Port	1			
22	Labels	5			



CONDITION CODES/OVERALL ASSESSMENT CODES					
Fabric Components: Webbing			Metal Components		
CONDITION DESCRIPTION	CODE	OVERALL ASSESSMENT CODE	CONDITION DESCRIPTION	CODE	OVERALL ASSESSMENT CODE
Cuts/Fraying	W1	'P' = Pass Webbing Acceptable	Deformed/Fractured	M1	'P' = Pass Metallic Acceptable
Abrasion/Wear	W2		Corroded/Deep Pits	M2	
Partially Missing/Altered	W3		Missing/Loose	M3	
Burns/Heat Exposure	W4	Heat Exposure	M4		
Chemical Exposure	W5	'F' = Fail Webbing Not Acceptable	Chemical Exposure	M5	
Other	W6		Burns/Sharp Edges	M6	
No Visible Change	W0		Cuts/Deep Nicks	M7	
<b>Fabric Components: Stitching</b>			<b>Plastic Components</b>		
Cut/Pulled/Loose Thread	S1	'P' = Pass Stitching Acceptable	Malfunction	M8	'P' = Pass Plastic Acceptable
Abrasion/Wear	S2		Other	M9	
Partially Missing/Altered	S3		No Visible Change	M0	
Burns/Heat Exposure	S4	'F' = Fail Stitching Not Acceptable	Cut/Broken	P1	
Chemical Exposure	S5		Wear/Damage	P2	
Other	S6		Missing/Loose	P3	
No Visible Change	S0		Burns/Heat Exposure	P4	
			Chemical Exposure	P5	
			Other	P6	
			No Visible Change	P0	

### Formal Inspection

MSA requires that all harnesses be inspected by a competent person other than the user at intervals of no more than six months per applicable standard or as specified by a formal fall protection program. Record formal inspections in the provided Inspection Log. Punch or indelibly mark the inspection grid attached to the harness. Do not use a harness with a formal inspection date older than six (6) months unless under provision of formal inspection program. MSA recommends that harnesses with formal inspection dates older than six (6) months be tagged "UNUSABLE" and removed from service until after formal inspection.

# Formal Inspection - Lanyard

## MSA Lanyard Inspection: Twin-Leg Lanyard

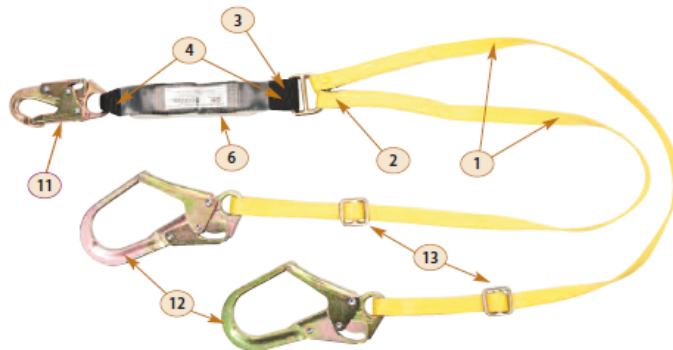


Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_ Manufacture Date \_\_\_\_\_

Inspector's Name \_\_\_\_\_ Inspection Date \_\_\_\_\_

**DISPOSITION (Circle One)**  
PASS FAIL

FORMAL INSPECTION LOG – LANYARD WITH ENERGY-ABSORBER					
INSR. POINT	DESCRIPTION	QTY/ Unit	CONDITION CODE(S)	OVERALL ASSESSMENT CODE	COMMENTS
<b>Fabric Components: Webbing</b>					
1	Lanyard Leg (Twin)	2			
<b>Fabric Components: Stitching</b>					
2	Lanyard Legs (Twin)	2			
<b>Energy-Absorber</b>					
3	Webbing, Loop (Twin)	2			
4	Stitching, Strap Loops	2			
5	Stitching, Cover	2			
6	Tear Tape	2			
7	Cover	1			
<b>Metal Components</b>					
11	Snaphooks, Twin (a)	2			
12	Large-Throat Opening Snaphook (Twin)	1			
13	Adjuster (Twin)	1			
<b>Plastic Components</b>					
17	Labels	5			



CONDITION CODES/OVERALL ASSESSMENT CODES					
Fabric Components: Webbing			Metal Components		
CONDITION DESCRIPTION	CODE	OVERALL ASSESSMENT CODE	CONDITION DESCRIPTION	CODE	OVERALL ASSESSMENT CODE
Cuts/Fraying	W1		'P' = Pass Webbing Acceptable	Deformed/Fractured	
Abrasion/Wear	W2	Corroded/Deep Pits		M2	
Partially Missing/Altered	W3	Missing/Loose		M3	
Burns/Heat Exposure	W4	Heat Exposure		M4	
Chemical Exposure	W5	'F' = Fail Webbing Not Acceptable	Chemical Exposure	M5	'F' = Fail Metallic Not Acceptable
Knotted/Elongated	W6		Burrs/Sharp Edges	M6	
Other	W7		Cuts/Deep Nicks	M7	
No Visible Change	W0		Malfunction	M8	
<b>Fabric Components: Stitching</b>			<b>Plastic Components</b>		
Cut/Pulled/Loose Thread	S1	'P' = Pass Stitching Acceptable	Other	M9	'F' = Fail Plastic Not Acceptable
Abrasion/Wear	S2		No Visible Change	M0	
Partially Missing/Altered	S3		<b>Plastic Components</b>		
Burns/Heat Exposure	S4	'F' = Fail Stitching Not Acceptable	Cut/Broken/Deformed	P1	
Chemical Exposure	S5		Wear Damage	P2	
Other	S6		Missing/Loose	P3	
No Visible Change	S0		Burns/Heat Exposure	P4	
<b>Energy-Absorber</b>			Chemical Exposure	P5	'F' = Fail Plastic Not Acceptable
Cut/Torn/Frayed	D1	'P' = Pass Energy-Absorber Acceptable	Other	P6	
Abrasion/Wear	D2		No Visible Change	P0	
Partially Missing/Altered	D3		Other	C8	
Burns/Heat Exposure	D4		No Visible Change	C0	
Chemical Exposure	D5	'F' = Fail Energy-Absorber Not Acceptable			
Cover Opened	D6				
Elongated	D7				
Other	D8				
No Visible Change	D0				

**DISPOSITION:** Circle "PASS" or "FAIL" on "Disposition" line above.

Criteria for **Disposition** of FAIL:

- If there is one or more Overall Assessment Codes of 'F' (ie. Webbing, Stitching, Metal, Plastic) on a **Priority 1** Item.

OR

- If there are three or more Overall Assessment Codes of 'F' on a **Priority 2** Item.



# Formal Inspection - Mechanical

## MSA Leading Edge Inspection: V-EDGE™ SRL (Cable)



Name \_\_\_\_\_ Clock No. \_\_\_\_\_

Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_ Manufacture Date \_\_\_\_\_

Inspector's Name \_\_\_\_\_ Inspection Date \_\_\_\_\_

The following inspection check list covers the V-EDGE Cable and Web PFLs for both single and twin models. Please refer to user manual for full user instructions.

FORMAL INSPECTION LOG					
ITEM	DESCRIPTION	QTY/ Unit	CONDITION CODE(S)	OVERALL ASSESSMENT	COMMENTS
1	Web/Cable Lifetime	1			
2	Snaphook	1			
3	Housing	1			
4	Labels	1			
5	Lock-on (rescue device locks)	1			
6	Load Indicator	1			



DISPOSITION (Check One)			PASS	FAIL		
<b>CONDITION CODES/OVERALL ASSESSMENT CODES</b>						
<b>Lifeline Components: Cable</b>			<b>Plastic Components</b>			
CONDITION DESCRIPTION	CODE	OVERALL ASSESSMENT CODE	CONDITION DESCRIPTION	CODE	OVERALL ASSESSMENT CODE	
Cuts/Fraying	W1	"P" = Pass Webbing Acceptable	Cut/Broken/Deformed	P1	"P" = Pass Plastic Acceptable	
Abrasion/Wear	W2		Wear Damage	P2		
Cable Binding/Broken Wires	W3		Missing/Loose	P3		
Burns/Heat Exposure	W4		Burns/Heat Exposure	P4		
Chemical Exposure	W5	"F" = Fail Webbing Not Acceptable	Chemical Exposure	P5	"F" = Fail Plastic Not Acceptable	
Knotted/Elongated	W6		Other	P6		
Other	W7		No Visible Change	P0		
No Visible Change	W0		Malfunction	M0		
<b>Operation/Functionality</b>			<b>NOTES</b>			
Does Not Lock Up	D1	"P" = Pass Locking Action Acceptable	<b>General condition</b> Examine for signs of excessive damage, wear, corrosion or contamination. Open the tear webbing case 6 and check for signs of cuts, abrasion, fraying/ broken strands, tears, burns, mould, discolouration or chemical attack. Check all cable for any signs of corrosion, damage or contamination. Ensure correct operation of connectors.			
Panel Stuck	D2					
Weak Spring Retraction	D3					
Other	D4					
No Visible Change	D0	"F" = Fail Locking Action Not Acceptable	<b>Labels</b> Ensure labels are legible.			
<b>Metal Components</b>			<b>Examination date</b> Ensure date of next examination has not lapsed.			
Deformed/Fractured	M1		"P" = Pass Metallic Acceptable	<b>Product life</b> Ensure product has not reached the end of its service life.		
Corroded/Deep Pits	M2			<b>Load indicator</b> Ensure load indicator has not been deployed.		
Missing/Loose	M3	<b>Retraction</b> Secure the device vertically, pull lifeline out and ensure retraction is smooth and unobstant (maintain a light tension on the lifeline while it retracts).				
Heat Exposure	M4	<b>Lock-on</b> Securely hold the shock tube 5 and pull sharply on the lifeline – ensure device locks. Holding the Shock tube protects the energy absorber from accidental deployment.				
Chemical Exposure	M5	"F" = Fail Metallic Not Acceptable				
Burns/Sharp Edges	M6					
Cuts/Deep Nicks	M7					
Malfunction	M8					
Other	M9					
No Visible Change	M0					

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**DISPOSITION:** Check "PASS" or "FAIL" on "Disposition" line above.  
Criteria for **Disposition** of FAIL: Harness FAILS if there is one or more Overall Assessment Code of "F" (i.e. Webbing, Stitching, Metal, Plastic)

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- **Background**

- In general industrial US 29 CFR 1910 has previously been limited to either eliminating any fall hazards by keeping the work tasks at ground-level, or by placing a barrier between the worker and the hazard, such as guardrails.
- In contrast, the rules in 29 CFR 1926 for construction has included PFAS as an additional option for protecting workers at heights.

- **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” (1910.21(b))

- The updates to 29 CFR 1910 have now aligned the two regulations – allowing PFAS for worker protection at heights.
- The new rule became effective January 2017.



- **Scaffolds**

- *1910.27(a)*: The new rule replaces the outdated general industry scaffold requirements with a direct reference to those in CFR 1926 for construction.

- **Fixed Ladders**

- *1910.28(b)(9)*: The new rule phases out a 1993 exception for the outdoor advertising industry that used to allow “qualified climbers” to forego fall protection. *1910.28(b)(10)*
- Additionally, fall protection must be installed/used on all fixed ladders over 24 ft. according to the timetable below

- **Work On Low Sloped Roofs (4 in 12 pitch or less)**

- *1910.28(b)(13)*: The rule adds provisions for work on low sloped roofs depending on the work frequency, duration, and distance from the edge of the roof. • Less than 6 ft. from the edge—Must use: guardrails, safety net, travel restraint, or PFAS • Between 6–15 ft. from the edge—May also use a “designated area” if work is infrequent and temporary • More than 15 ft. from the edge—Must protect with an option above unless work is infrequent or temporary

- **Training**

- *1910.30*: The rule adds the requirement that before any employee is exposed to a fall hazard, the employer must provide training. This requirement must be met before May 17, 2017 and must cover at least the following topics:
  - Nature of fall hazards in the work area and how to recognize them
  - Procedures to be followed to minimize hazards
  - Procedures for installing, inspecting, operating, maintaining, and disassembling the PFAS used
  - Correct use of PFAS including but not limited to: proper hook-up, anchoring, and tie-off techniques, and methods of equipment inspection and storage, as specified by the manufacturer

## ***Do you know the differences? / Why the Changes?***

### ➤ **Scaffolds – 1910.27(a)**

Scaffolds used in general industry must meet the requirements in 29 CFR part 1926, subpart L

### ➤ **Fixed Ladders – 1910.28(b)(9)**

The new rule phases out a 1993 exception for the outdoor advertising industry that used to allow “qualified climbers” to forego fall protection. *1910.28(b)(10)* Additionally, fall protection must be installed/used on all fixed ladders over 24 ft. according to the timetable below

### ➤ **Work On Low Sloped Roofs**

#### **(4 in 12 pitch or less) – 1910.28(b)(13)**

The rule adds provisions for work on low sloped roofs depending on the work frequency, duration, and distance from the edge of the roof. • Less than 6 ft. from the edge—Must use: guardrails, safety net, travel restraint, or PFAS • Between 6–15 ft. from the edge—May also use a “designated area” if work is infrequent and temporary • More than 15 ft. from the edge—Must protect with an option above unless work is infrequent or temporary

### ➤ **Scaffolds – 1926.45(g)(i)**

Subpart L; Each employee on a scaffold more than 10 feet (3.1 m) above a lower level shall be protected from falling to that lower level.

### ➤ **Fixed Ladders – 1926.1053(a)(19)**

Subpart X; Where the total length of a climb equals or exceeds 24 feet (7.3 m), fixed ladders shall be equipped with one of the following: Ladder safety devices; or Self-retracting lifelines, and rest platforms at intervals not to exceed 150 feet (45.7 m); or A cage or well, and multiple ladder sections, each ladder section not to exceed 50 feet (15.2 m) in length.

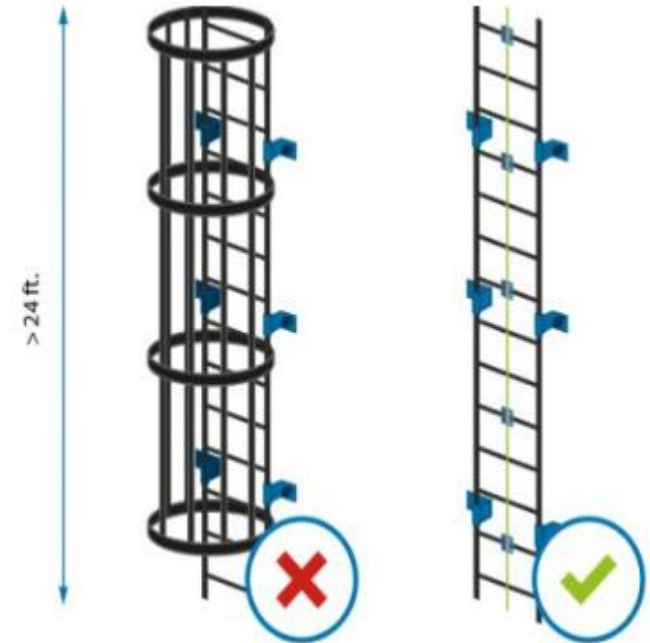
### ➤ **Work On Low Sloped Roofs**

#### **(4 in 12 pitch or less) – 1926.501**

Subpart M; Unprotected sides and edges." Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.

- **1910.28(b)(10)** Fall protection must be installed/used on all fixed ladders over 24ft according to the timetable below.
- **Existing installations** (before November 19, 2018) must have a PFAS, ladder safety system, cage, or well.
- **New installations** (after November 19, 2018) must have a PFAS or ladder safety system. Cages and wells will no longer be acceptable. Fixed ladder, cage, or well replacements or any sections thereof must have PFAS or a ladder safety system installed at least on the replaced section.
- **Final deadline** – November 2036 all fixed ladders must be equipped with a PFAS or ladder safety system.

OSHA expectation by 2036

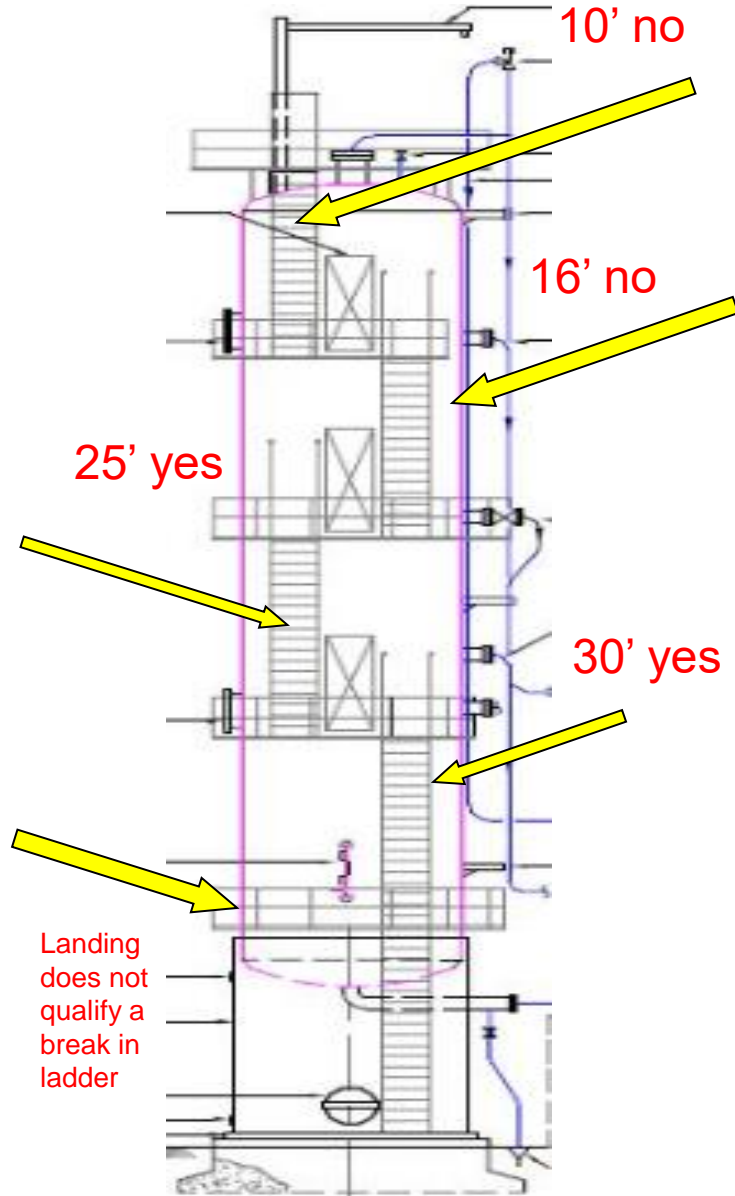
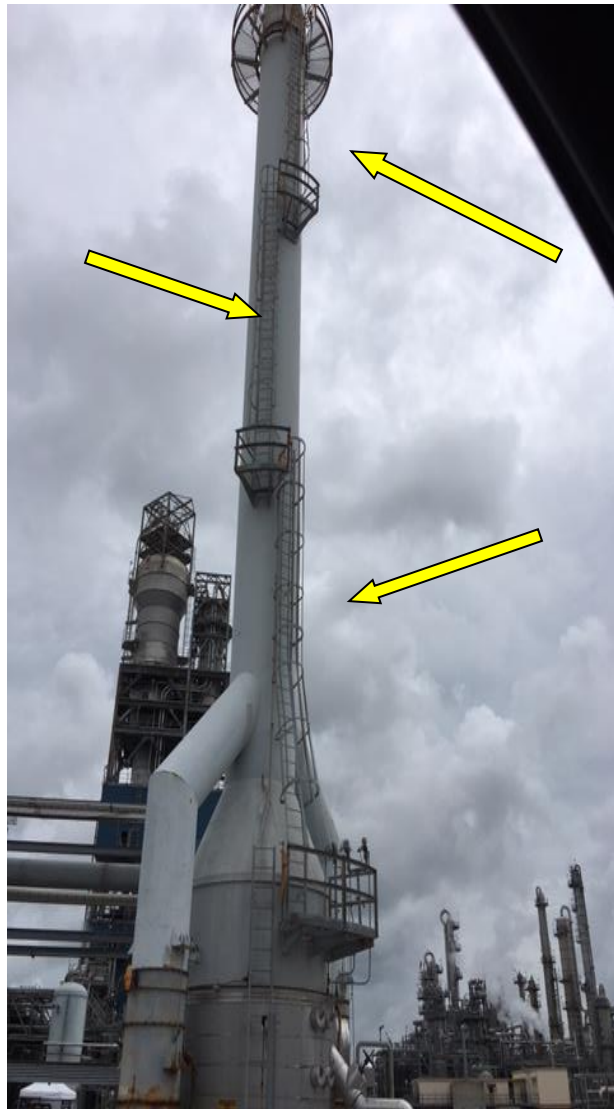


# Falls in a Cage Well

Studies have proven falling in a cage well can be dangerous.

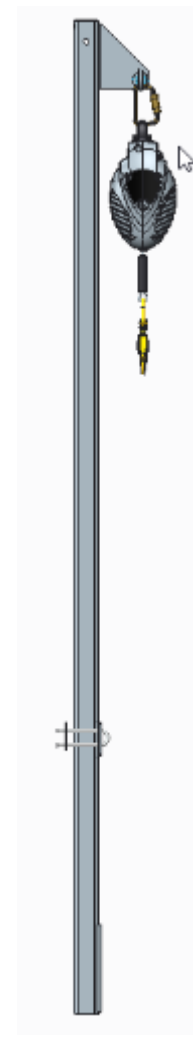
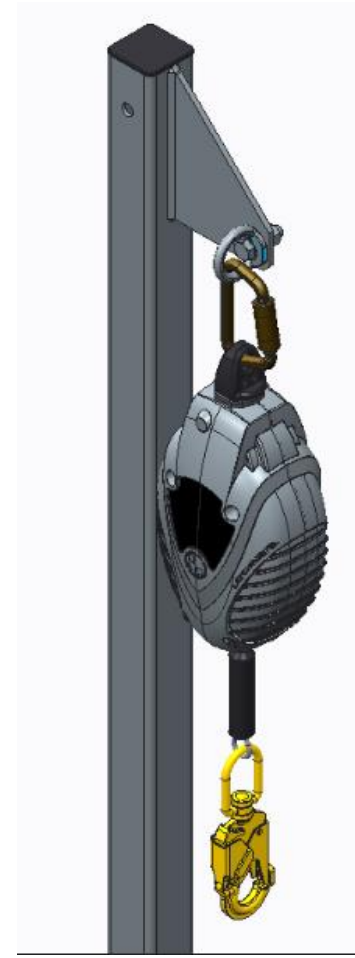
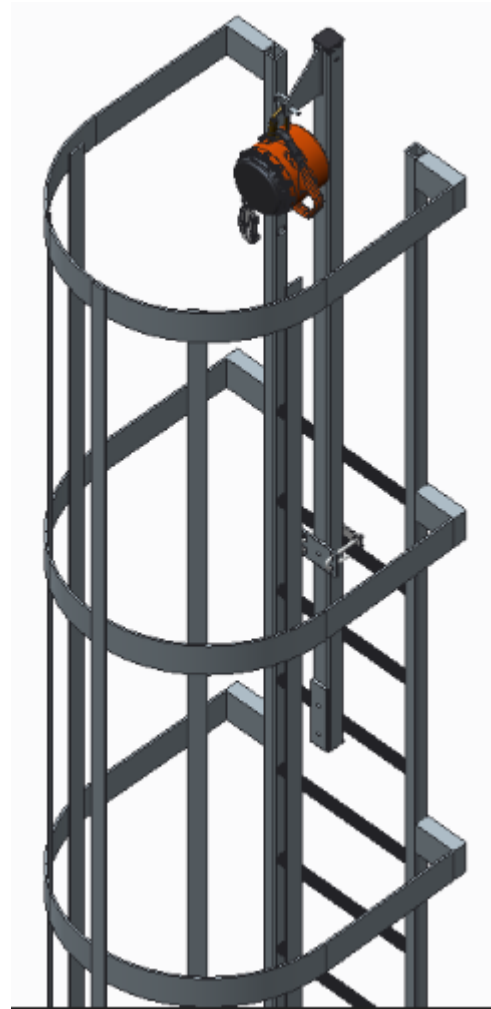
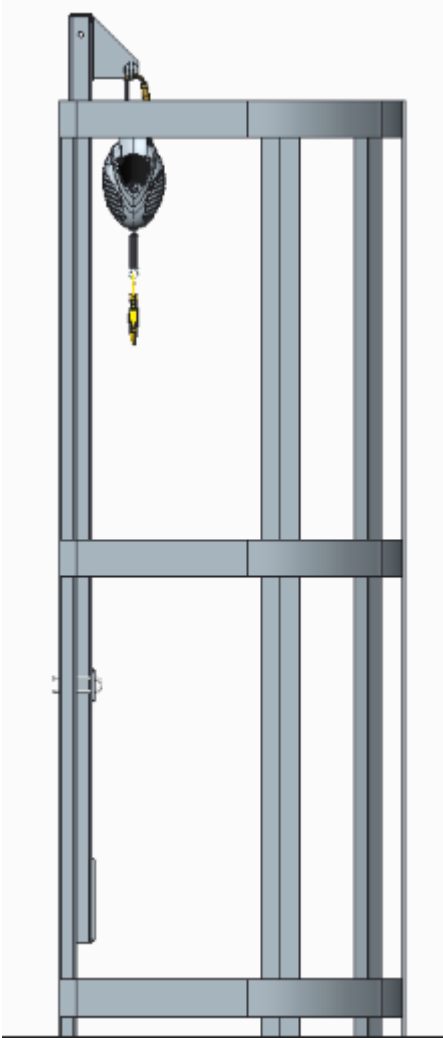


# Fixed Ladders with Cage Well





# Davit System w/ SRL

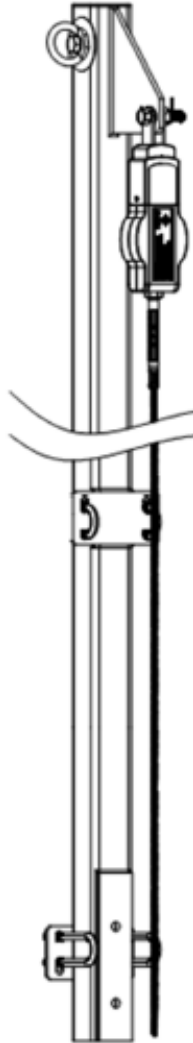


# Davit System w/ SRL



# Ladder Extension post with D-Ring

## Vertical System Kit



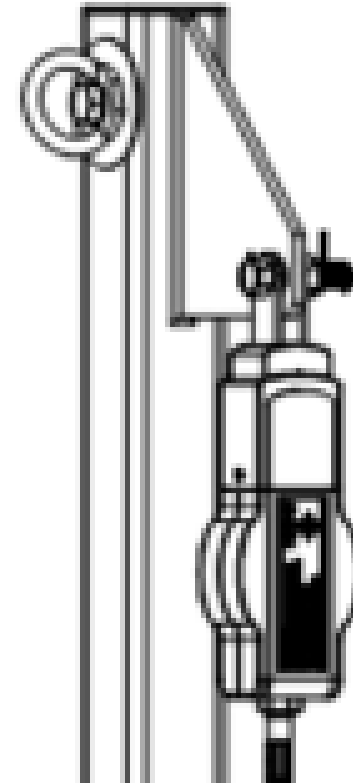
- 1x 30001-12: Ext. Post, Galv
- 1x 30004-00: Fixing Kit
- 1x 85535-00: Absorber, Yellow
- 1x 85025-00: Swage Slip Indicator

### Alternate:

- 1x 30160-00: Ext. Post, SST

### Optional Transfer D-Ring:

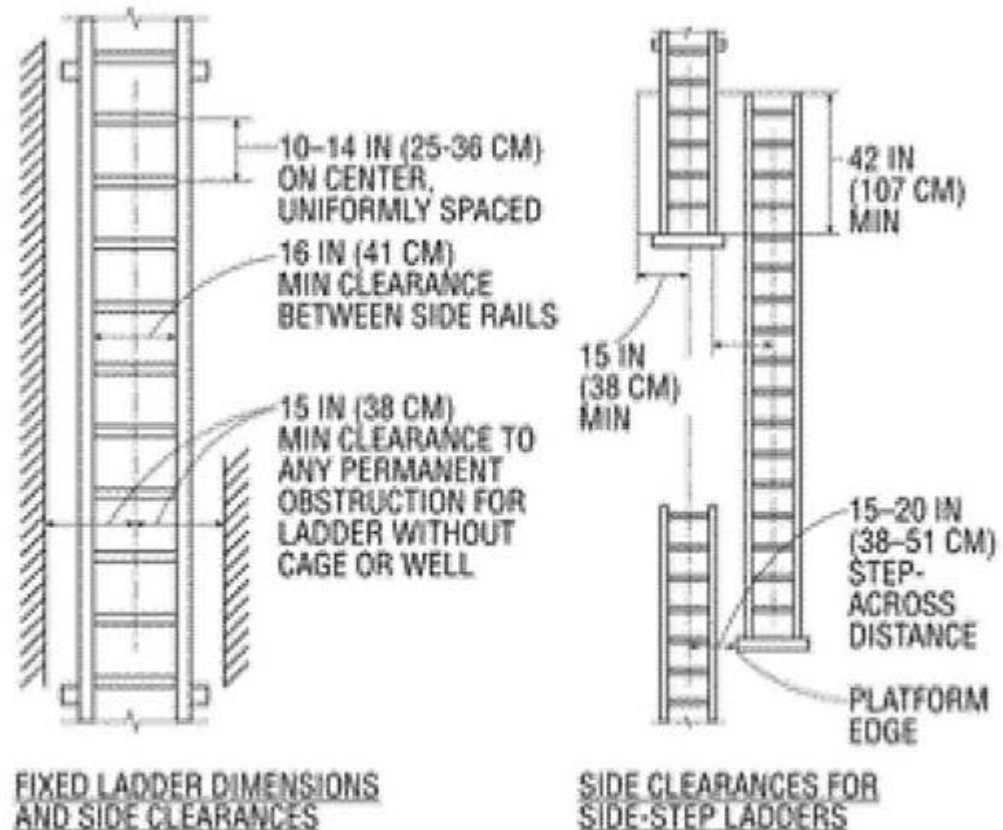
- 1x 85030-00: D-Ring
- 1x 85042-00UK: Label
- 1x 00401-11: M12 x 100 Bolt
- 1x 00200-05: M12 Flat Washer
- 1x 00200-36: M12 Spring Washer
- 1x 00300-01: M12 Nut



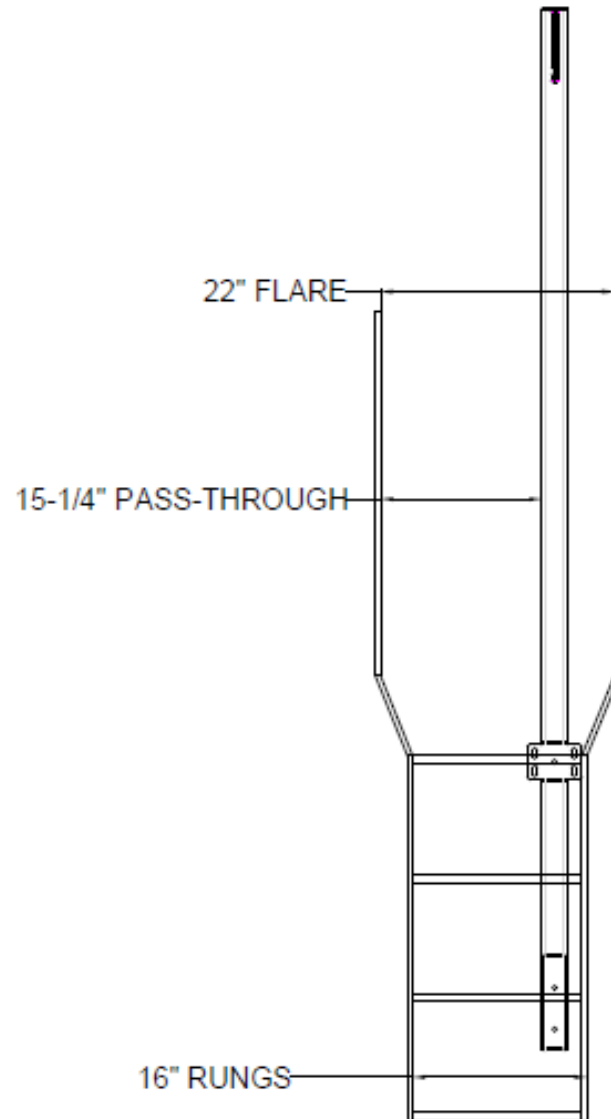
# OSHA Ladder Requirements

- The OSHA requirement on ladders is found in Paragraph 1910.29(i)(6):
  - Ladder safety systems and their support systems are capable of withstanding, without failure, a drop test consisting of an 18-inch (41-cm) drop of a 500-pound (227-kg) weight.

- Step through ladders;
  - Ladder Width = 16"
  - Rung Spacing = 10"-14"
  - 42" above surface
  - Flare out 22" min / 36" max

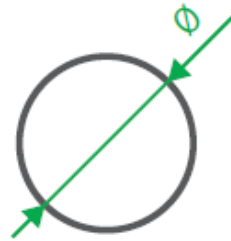
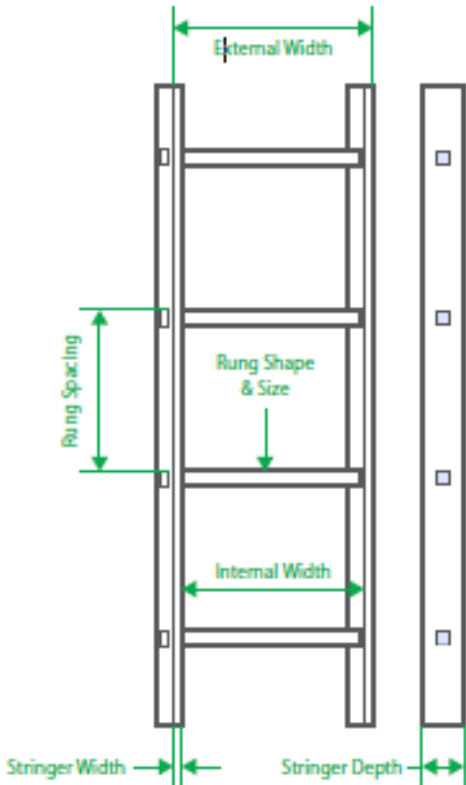


# Pass Through Dimensions

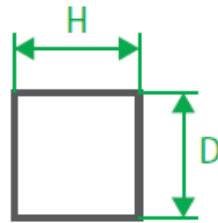


# What information do we need?

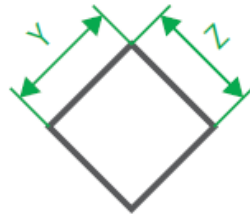
- System Type
- Ladder Length
- Ladder Material
- Ladder Condition
- Rung Type
- Rung Spacing



Round Rung



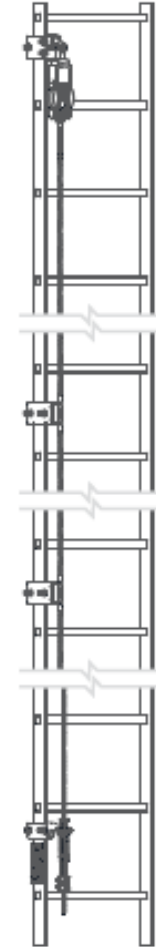
Square Rung



Diamond Rung



Rung-Mounted System



Stringer System



Extension Post

# VLL Fixed Ladder System components



## Top anchor

The top anchor is a bracket with a built-in safety factor greater than 2 times the potential load generated when a fall occurs.

## Constant Force energy absorber

The Constant Force energy absorber ensures that the load applied back to the structure and the climber, in the event of a fall, is limited to a maximum of 1350 lbs (6 kN).

## Intermediate cable guides

These brackets support the cable, ensuring that a correct stand-off distance from the structure is maintained.

## Bottom anchor

The bottom anchor is a bracket that provides a swage-free system termination and an integral tensioning device.

# GTFA – Ladderlatch® TowerLatch® & TowerLatch® SP



- Smooth, hands free operation
- Unique patented starwheel design
- Fast lock cam
- Removable at any point of system
- Manufactured from austenitic stainless steel
- Anti-inversion mechanism
- Highly resistant to wear and environment
- Webbing stop to facilitate rescue for Towerlatch units
- TowerLatch SP version built in shock pack
- Easy maintenance and inspection
- Up to 10 years life expectancy
- Standards compliant (new ANSI Z359.16)
- Very popular with users



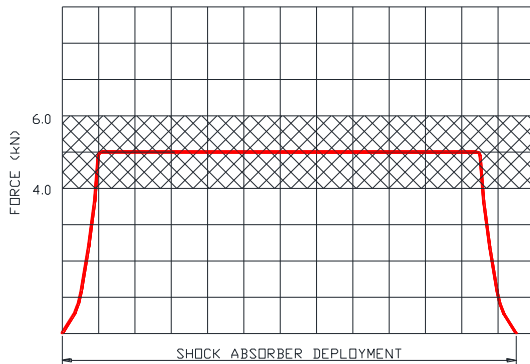


# Energy absorber

- Forces created at the time of fall will transmit to the device and will be absorbed using our constant force technology, limiting the forces on the worker and structure to 6kN (1350 lbs).
- After deployment, red fluorescent strip will show in contrast with yellow or grey casing (helicopter check).
- Capacity max. 2 users (310 lbs each.) at once plus 1 rescue (260 lbs), possible to double using 2 absorbers in a system.



TYPICAL DYNAMIC PERFORMANCE



# Off the Shelf Solutions

- **Latchways VLL Kits**

- Easy Install
- End user to assure that ladder can hold 2,700 lb.
- Works with rungs from 5/8" to 1" round
- 5/16" (8mm) 316 stainless steel cable
- Meets requirements of ANSI Z359.16 and CSA Z259.2.5
- Maximum angle for the ladder is 15°
- Kit lengths from 20' to 90'
- 2 users 1 rescuer typical
- Guided Type Fall Arrester (GTFA) sold separately
- Sold through MSA/Latchways Distribution

- **VLL Kits w/o Post**

- 30901-00 – 20 ft
- 30902-00 - 40
- 30903-00 - 55
- 30904-00 - 75
- 30905-00 - 90

- **VLL Kits w/ Post**

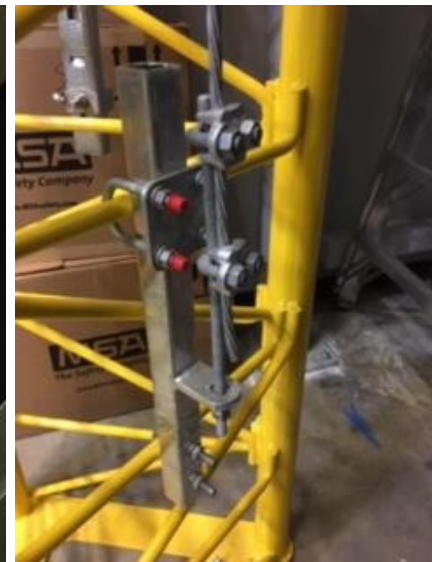
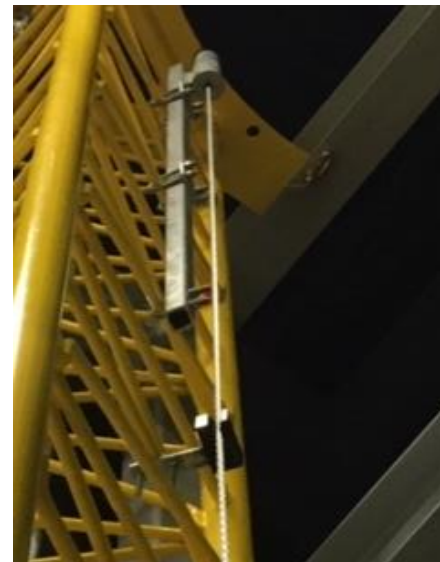
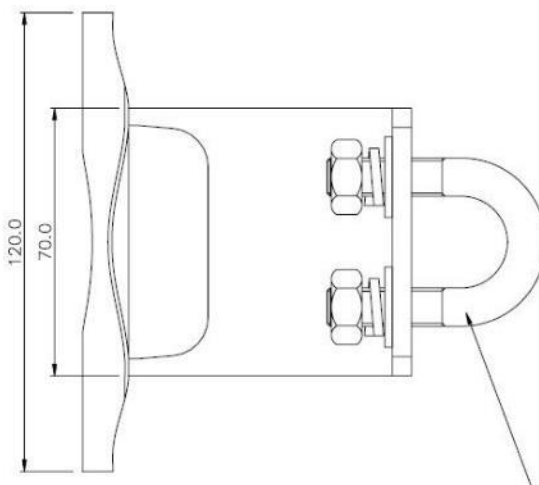
- 31901-00
- 31902-00
- 31903-00
- 31904-00
- 31905-00

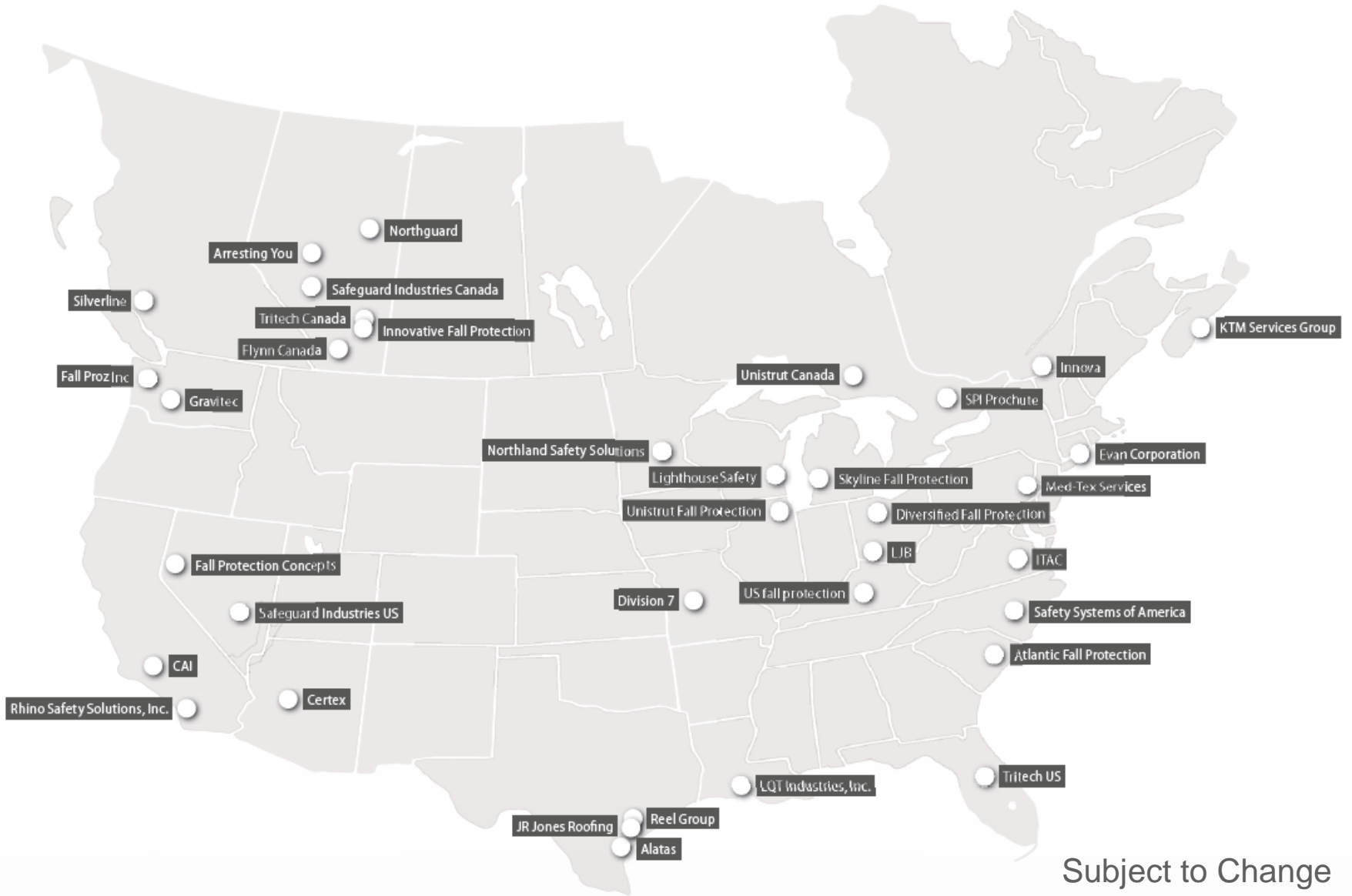
- **LadderLatch**

- 3104L-00



# Ladder kit comparison (they are not all alike)





Subject to Change

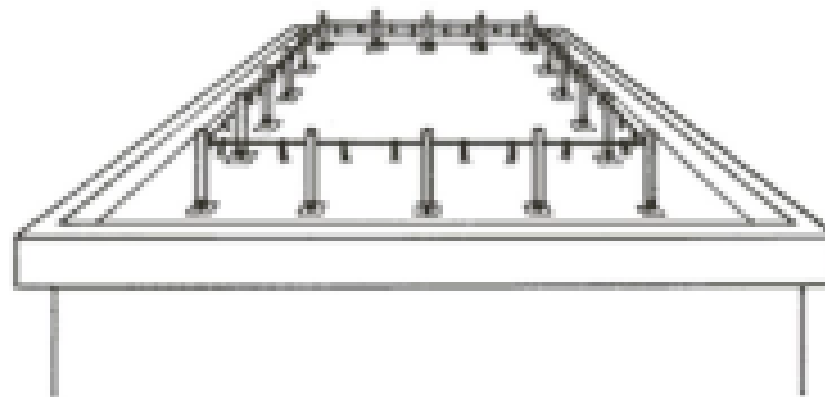
- What's the difference?
  - Integrator has installation crew, in house engineering, and in-house fabrication
  - Installers typically only do the install themselves. They sub out the engineering and fabrication.
- Responsibilities
  - Maintain the proper insurance, certification, and licensure
  - Provide a fully documented solution
    - Structural certification from PE
    - System load calculations
    - User instructions and training
    - Full set of drawings with systems details



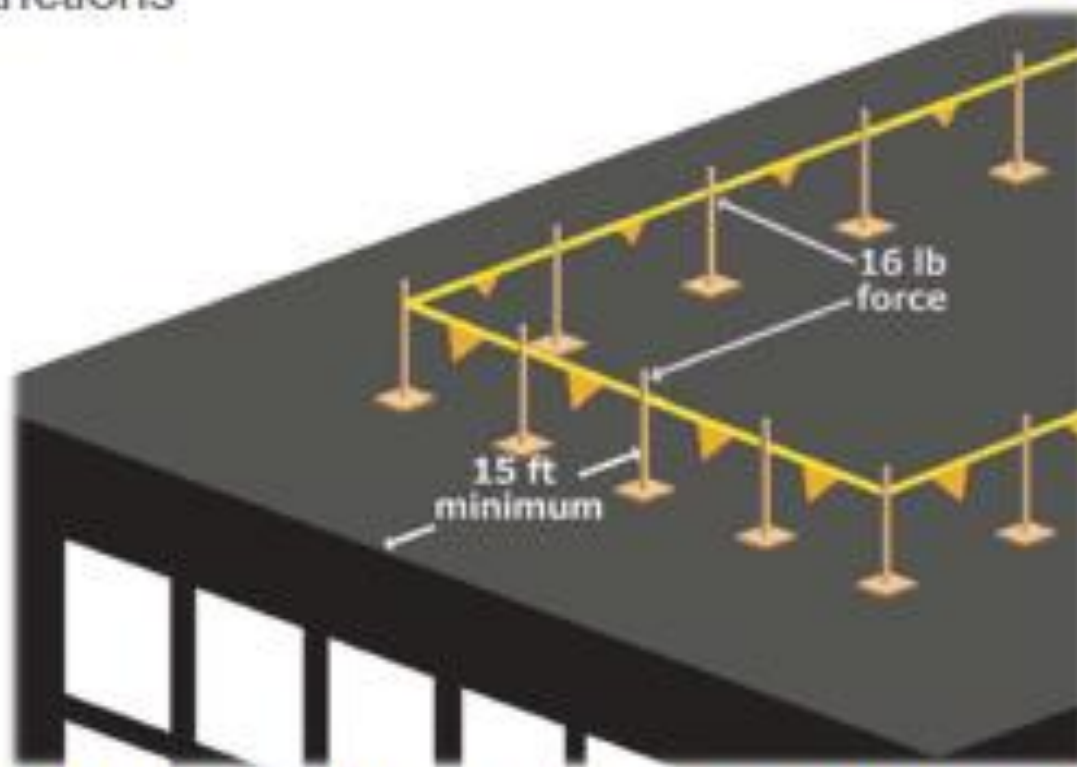
The rule adds provisions for work on low sloped roofs depending on the work frequency, duration and distance from the edge of the roof.

1. Work < 6' from edge: Must use (1) guardrail, (2) net, (3) restraint, or (4) PFAS
2. Work between 6' & 15' from edge, may use: guardrail, net, restraint or PFAS
  - Designated Area w/ "temporary and infrequent work"
3. Work > 15' from the edge requires, must protect with an option above unless work is infrequent or temporary.
  - Designated Area (doesn't have to be temp & infrequent / line 15' back)
  - No FP required if the work is "infrequent and temporary" & if there is a work rule prohibiting employees from going closer to edge w/out prot.

- 4-sided set of lines in-place to warn workers of edge hazard
  - NOT a guardrail
  - Distances from edge:
    - ✓ 6' - General
    - ✓ 10' – “Mechanical Equipment”
  - Permit work inside w/ no PFAS
  - Points of access, materials handling areas, storage areas, and hoisting areas connected by access path formed by two warning lines
    - ✓ Rope / Wire / Chain Gate or “Other Barricade”
    - ✓ Offset Access
      - ❖ Marked every 6'
      - ❖ 34" > Line < 39"
      - ❖ Tip Force > 16 lbs.
      - ❖ Line min. 500 lbs.
      - ❖ Prevent slack buildup



- Originally just for roofers doing roofing work
  - May 12<sup>th</sup>, 2000 LOI permitted use for other activities, with restrictions



**"Fall Protection Myths and Misconceptions: Working Within the OSHA System"**



- Before exposure to a fall hazard, employees must be trained –  
must occur before  
May 17, 2017
- Training to be done by a “qualified person”
- Retraining
- Training must be understandable
- Topics:
  - Nature of fall hazards in work area & how to recognize them;
  - Procedures to follow to minimize those hazards;
  - Correct procedures for installing, inspecting, operating, maintaining, & disassembling the systems the employees will use;
  - The correct use of PFPS's, including proper hook-up, anchoring, tie-off techniques, inspection, and storage as specified by MFG.

- <https://www.osha.gov/walking-working-surfaces/faq.html>
- <https://www.osha.gov/walking-working-surfaces/>
- <https://www.osha.gov/Publications/OSHA3903.pdf>



**THANK YOU!**

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