



# Essential Strategies for Workplace Fall Protection

**Safe Workers, Safe Rooftops:** A Comprehensive Look at  
Common Hazards and Fall Protection Solutions

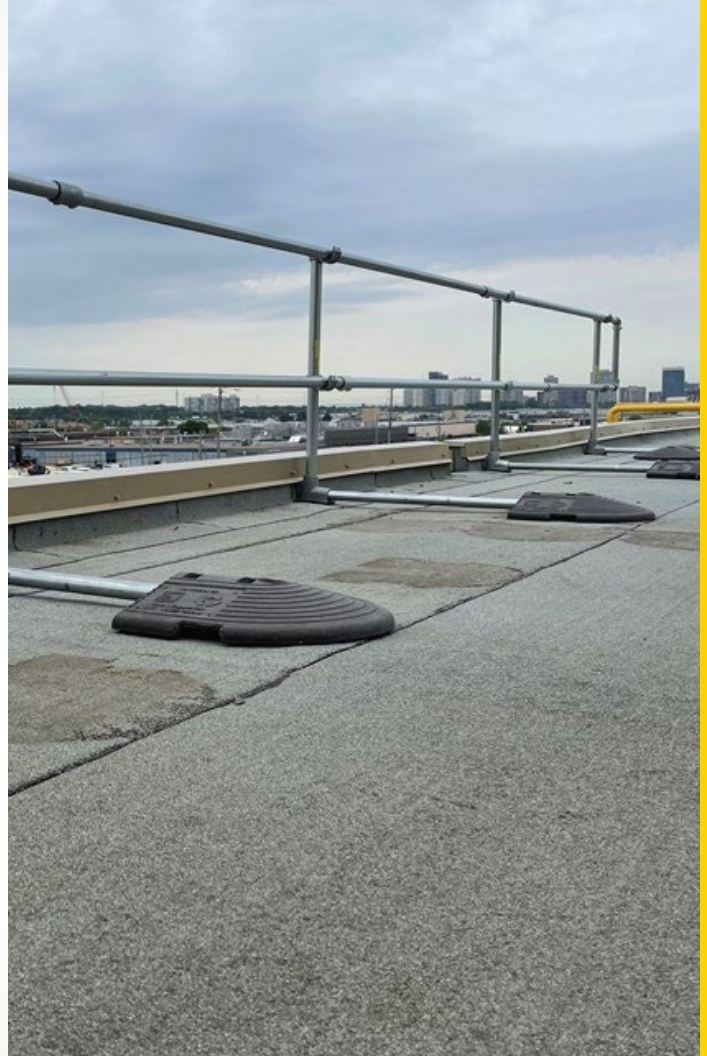


SEPARATING PEOPLE FROM HAZARDS

**Industry Insights**

# Kee Safety: Your Fall Protection Experts

At Kee Safety, education is the foundation of safety. Our team is dedicated to assisting you with every aspect of your project, regardless of its scope. We work closely with you to customize our fall protection systems to meet your requirements and ensure the safety of your employees, contractors, and facility. Our commitment to your safety doesn't end with installation - we'll be there at every step, from system inspection and assessment to ongoing service requirements.





# LEARNING OBJECTIVES

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01

## **The Importance Of Fall Protection**

Prevent workplace fatalities and injuries with fall protection solutions.

02

## **Identifying And Mitigating Risks**

Understanding the principles of fall protection risk assessment to minimize workplace hazards.

03

## **Exploring The Most Common Hazard Areas**

Safeguard your workplace by identifying the most common hazard areas.

04

## **Addressing The Most Common Questions**

Expert answers to frequently asked questions.

# GENERAL INDUSTRY FALL SAFETY STANDARDS

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While construction codes strictly govern activities carried out during the erection or renovation of a structure, General Industry codes extend beyond those phases to encompass ongoing maintenance and operation. This guide will focus solely on the nuances of the General Industry code, shedding light on the specific regulations governing fall protection for individuals involved in the long-term maintenance and functionality of a building.

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General Industry code provides comprehensive standards for individuals responsible for ongoing maintenance, including regular inspections, repairs, and accessing elevated areas.\*



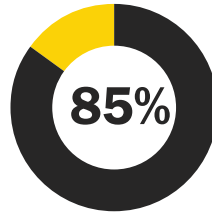
\*These codes can be found in OSHA 1910.28



25,000



The number of slip-and-fall accidents occurring EVERY DAY in all occupations.



The percentage of Worker's Compensation claims attributed to slip-and-fall injuries.

\$70 BILLION

The amount employers pay annually in medical and compensation costs.



75

### THE DANGERS OF SKYLIGHTS

Between 2017-2021, **75 worker fatalities** occurred in the United States due to falls through skylights [OSHA, 2022].



# We Assess Risk Based on 2 Factors:

- 1 Severity of Injury:** In fall protection assessment, the severity of a fall-related injury is always assumed to be **life-threatening**.
- 2 Likelihood:** The greatest predictor for the likelihood of an accident occurring is to review the **frequency** of exposure to the hazard on the roof.

**Risk = Severity X Likelihood:** We prioritize our Risk Assessment based on the critical danger and how frequently workers are exposed.

		LIKELIHOOD					Risk Assessment Matrix
		1 NEAR IMPOSSIBLE	2 UNLIKELY	3 POSSIBLE CHANCE	4 LIKELY	5 ALMOST CERTAIN	
POTENTIAL SEVERITY	1 INSIGNIFICANT	1	2	3	4	5	
	2 MINOR INJURIES	2	4	6	8	10	
	3 NOTABLE INJURIES	3	6	9	12	15	
	4 MAJOR INJURIES	4	8	12	16	20	
	5 DEBILITATING INJURY DEATH	5	10	15	20	25	

| THE HIERARCHY OF FALL PROTECTION

# ENSURING SAFETY

## Maximizing Rooftop Safety: A Four-Level Hierarchy of Fall Protection Solution

A truly comprehensive rooftop solution follows the Hierarchy of Fall Protection, the gold-standard of safety procedures. An expert starts by inspecting the roof site for potential fall hazards. From there, a complete system solution and recommendations that descend down the four levels of the hierarchy—from simple, sensible approaches for eliminating risks all the way down to lifesaving personal protection systems.

Collective Systems require no additional training to use. Work Restraint and Fall Arrest Systems both require a high level of user competency, training and additional inspection to be used effectively.

LOW SEVERITY

# 1

## ELIMINATE HAZARDS

The preferred solution to all fall hazards is elimination of the danger.



## ROOFTOP EXAMPLE: SKYLIGHT PROTECTION

Remove skylight and roof over it.

HIGH SEVERITY

# 2

## COLLECTIVE

This solution "collectively" protects everyone. Rooftop perimeter guardrail is the most common example of collective fall protection.



Put a screen over or railing around the skylight.

# 3

## WORK RESTRAINT

Prevents a fall from occurring by using personal fall arrest equipment so that the user cannot reach the roof edge.



Anchor Point designed to keep user 2 feet away from skylight.

# 4

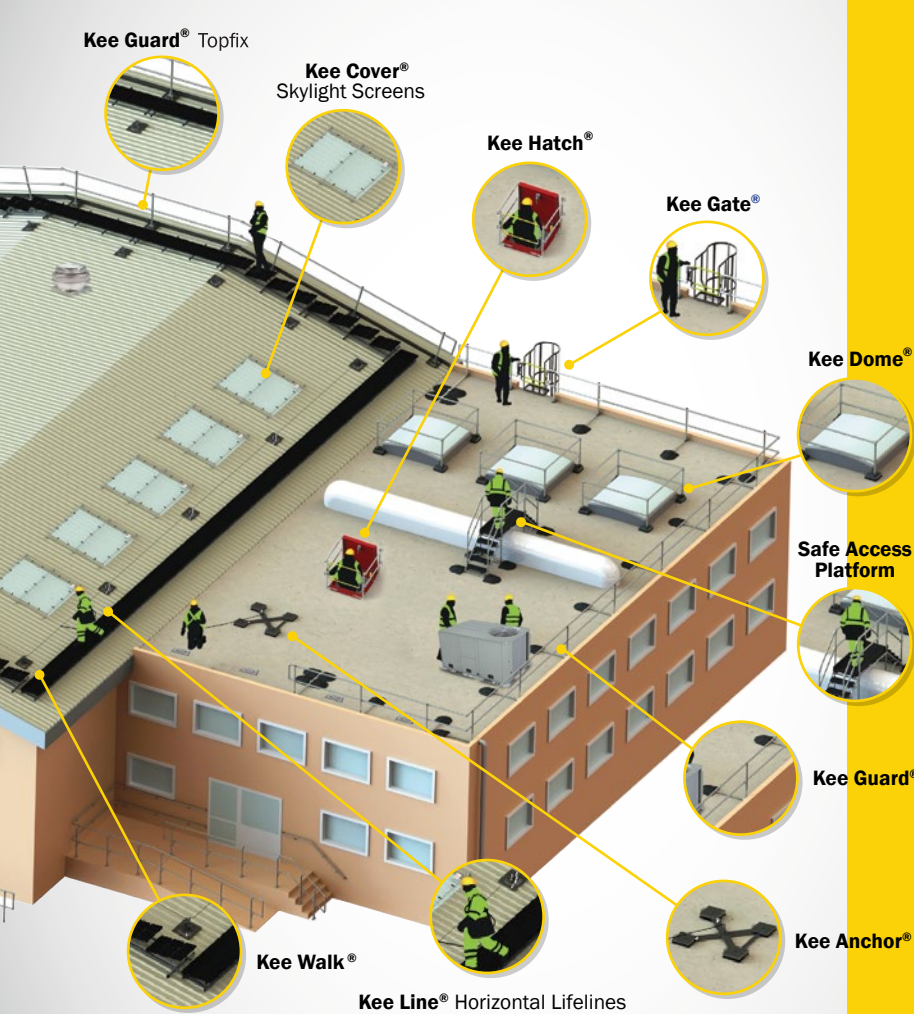
## FALL ARREST SYSTEM

A fall is possible, but the fall is "arrested" or interrupted within an acceptable force and fall distance.



Anchor point designed to allow user to fall through the light but not impact lower level.

WARNING: Breaking dome will result in other injuries.



**Keel Guard®** Topfix

**Keel Cover®**  
Skylight Screens

**Keel Hatch®**

**Keel Gate®**

**Keel Dome®**

**Safe Access Platform**

**Keel Guard®**

**Keel Anchor®**

**Keel Walk®**

**Keel Line®** Horizontal Lifelines

# ROOFTOP FALL PROTECTION

## USING AN INTEGRATED SOLUTION: A COMPLETE ROOFTOP FALL PROTECTION SYSTEM

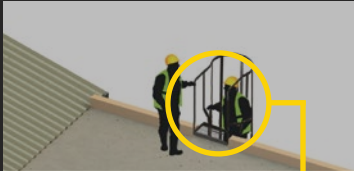
Integrated solutions that incorporate a complete rooftop fall protection system is essential for protecting workers from falls on rooftops. This means addressing hazards such as skylights and roof openings, in addition to providing guardrails or other fall protection equipment at the edge of the roof. By implementing a comprehensive fall protection system that includes safety gates, screens, or covers, as well as proper anchor points and personal protective equipment, employers can help ensure that workers are able to safely perform their jobs without the risk of falling from height.

**When access to the entire roof is required, the safest most comprehensive solution is a perimeter railing system that surrounds and protects all roof edges.**



# EXPLORING ROOFTOP HAZARDS

Logic Based Approach to Danger Zones and OSHA's Safety Guidelines



## 1 OSHA Code: 1910.28(b)(3)(iv) Access Points

Access points are the most frequented hazard on any rooftop. Workers are exposed to this risk twice - every time they enter and exit the roof to perform tasks. If a worker is required to access the roof 8 times per year, they are exposed to the access point hazard 16 times. OSHA requires that all ladders and hatches be secured with a self-closing gate and safety-compliant railing.



## 2 OSHA Code: 1910.28(b)(3)(i) Rooftop Openings

Openings are critical yet often overlooked hazards. Kee Safety gives top priority to protecting all rooftop openings, including skylights as roof holes. Surprisingly, falls through skylights lead to more accidents than falls over the roof edge. Workers traversing the middle of the rooftop face the risk of missteps and falls. Ensuring proper protection of all openings is paramount for maintaining worker safety.



## 3 OSHA Code: 1910.28(b)(13) Unprotected Edges

Proximity to the roof edge significantly affects the risk of accidents. As per OSHA regulations, any building where work is conducted within 15' of an open roof edge necessitates worker protection through guardrails or approved safety systems. Often, workers access the roof to service equipment, highlighting the importance of documenting if the equipment is situated too close to an unprotected edge.



## 4 OSHA Code: 1910.5(a)(1) Obstacles

Understanding the path that workers take across the roof is necessary for a complete fall protection assessment. Obstacles on the roof force workers to unsafely climb over or step around the obstructions, often placing workers at risk by walking too close to the roof edge and slipping off.

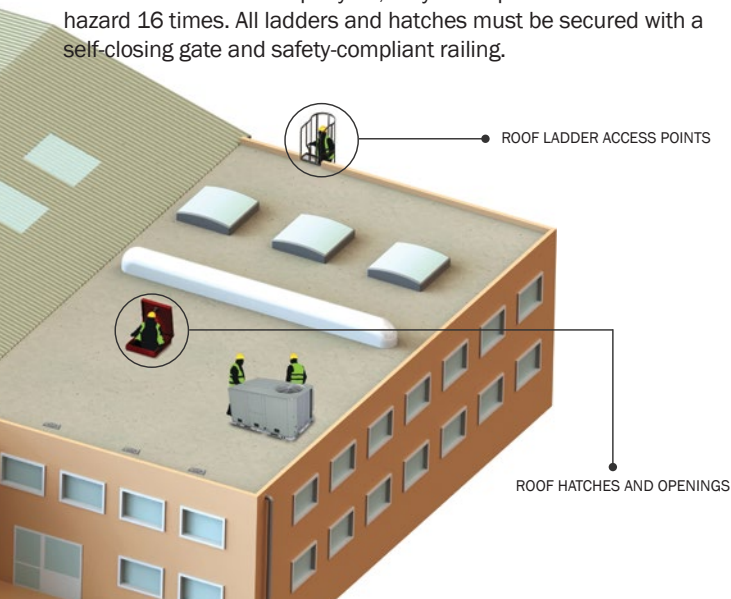
# IDENTIFYING DANGER ZONES: ACCESS POINTS

## Understand how workers get on and off the rooftop

When climbing up onto the rooftop to perform maintenance tasks and when exiting the work zone, there is a high potential to slip or fall. Providing safe egress and ingress for workers is critical.

## Access Points

Access points are the most frequented hazard on any roof. Your workers are exposed to this risk twice every time they enter and exit to perform tasks. For example, if your worker is required to access the roof 8 times per year, they are exposed to the access hazard 16 times. All ladders and hatches must be secured with a self-closing gate and safety-compliant railing.



## Spotting Hazards on the Roof

### Access Points:

OSHA Code: 1910.28(b)(3)(iv)

Each employee is protected from falling into a ladder way, floor hole, or ladder way platform hole by a guardrail system and toe boards erected on all exposed sides, except at the entrance to the hole, where a self-closing gate or an offset must be used\*

\*Chains are no longer permitted for use as a fall protection system on rooftop access points.

### 1 Unprotected Roof Hatch

Unprotected roof hatches are one of the most common fall hazards on commercial roofs. The hazard is falling through the roof opening while the lid is open. Keep Hatch is designed for safe egress and ingress through the roof hatch while the hatch is open.

### 2 Unprotected Fixed Ladders

Unprotected Fixed Ladders exist on the side of buildings either from roof to ground, or roof to roof transition points. The hazard is falling on either side of the ladder, or through the ladder opening. Keep Guard Ladder Access Kits provides a permanent guardrail on either side of a fixed ladder with the added protection of a self-closing safety gate.



## Can I use chains instead of a self-closing gate?

Using a chain as ladder protection is not recommended or compliant with OSHA regulations. Chains cannot close themselves, and relying on someone else to reattach the chain poses safety hazards. Reattaching the chain while descending the ladder puts the worker in a precarious position. A self-closing gate always provides reliable protection, eliminating user error. OSHA mandates the use of guardrails, toeboards, self-closing gates, or offsets at ladderway entrances to prevent falls. Replace chains with compliant gates on ladders and ensure OSHA-compliant equipment. Seek professional assistance for assessments and compliance.



## When do I need a vertical climbing device on my ladder?

Fixed ladder systems are prevalent in various industries such as cell phone towers, oil platforms, storage silos, water towers, and most commercial buildings. However, workers climbing these permanently fixed ladders with cages often have a false sense of security. OSHA regulations require the use of a vertical lifeline for fixed ladders over 24 feet. It is required to use vertical lifelines instead of ladder cages as cages do not prevent vertical falls. If a worker slips on a ladder rung with a cage system, they can fall to the ground or collide with the cage, making rescue challenging.



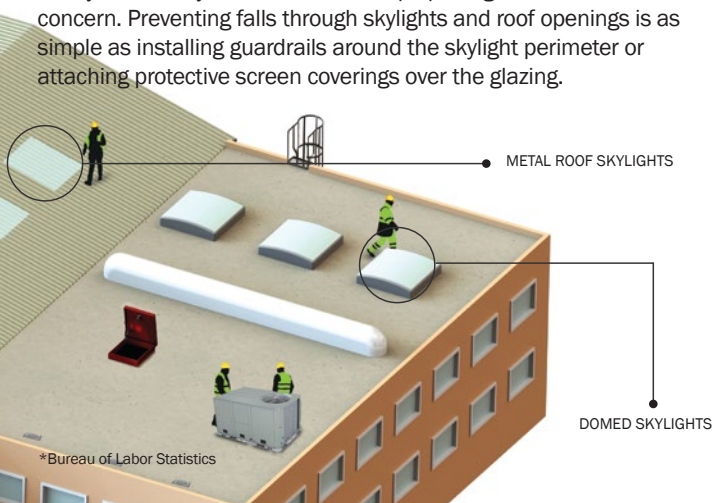
# IDENTIFYING DANGER ZONES: ROOFTOP OPENINGS

## Skylights

Skylights present a danger for any individual on the rooftop. OSHA considers skylights to be the equivalent of a hole in the roof. Every skylight opening and roof hole must be guarded by a standard skylight screen or a standard railing on all exposed sides.

## Rooftop Openings

Openings are often overlooked, but extremely critical to protect. A worker traversing the middle of the roof has a false sense of security when working far from the roof edge. If workers are carrying equipment, or focused on the job at hand, it is easy to misstep and fall through an opening. Statistically, in the USA, more people fall through skylights than over the edge of the roof\*, which is why Kee Safety evaluates all rooftop openings as a serious risk concern. Preventing falls through skylights and roof openings is as simple as installing guardrails around the skylight perimeter or attaching protective screen coverings over the glazing.



\*Bureau of Labor Statistics

## Spotting Hazards on the Roof

### Rooftop Openings: OSHA Code: 1910.28(b)(3)(i)

Each employee is protected from falling through any hole (including skylights) that is 4 feet (1.2 m) or more above a lower level by one or more of the following:

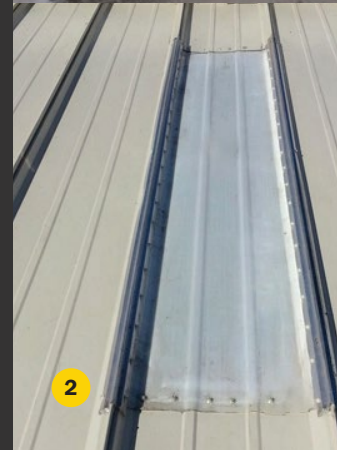
- Covers
- Guardrail Systems
- Travel Restraint Systems
- Personal Fall Arrest System

### 1 Unprotected Dome Skylights

Dome skylights, due to their exposure to the damaging effects of UV radiation over extended periods, are gradually susceptible to degradation, resulting in an increased vulnerability to breakage.

### 2 Exposed Panel Skylights

Panel skylights found on metal roofs are uniquely dangerous because they are flush with the roof panel and go unnoticed by workers on the roof. Kee Cover is designed to provide a structural barrier to protect workers from falling through these openings.



## Is my skylight fall protection rated?

Skylights are typically manufactured out of a polymer or plastic dome. Over time, UV degradation breaks down the strength of that dome, much like plastic deck furniture starts to breakdown in the sunlight over the years. As time passes, the dome becomes brittle, making the falls through skylights one of the top causes of rooftop falls. Many skylights have stickers on the side that state "danger risk of fall" However, if you do not see that warning sticker on the curb of your skylight you are not necessarily safe, it is very likely the sticker may be completely sun-faded.



## I have bars under my skylight, do I need to protect the dome?

Bars welded under a skylight are typically referred to as "burglar bars" and are designed to keep would-be thieves from breaking the skylight to access the facility and steal the equipment. OSHA requires that all skylight "covers" are required to be able to take twice the intended load, and the bars or wiring under the skylight may not be able to withstand the loadings. Additionally, bars below the dome do not eliminate all hazards associated with a fall. In the event of a fall, the dome will break and potentially cause lacerations on the injured party. Furthermore, debris and biological containments will fall into the people or process below the skylight.



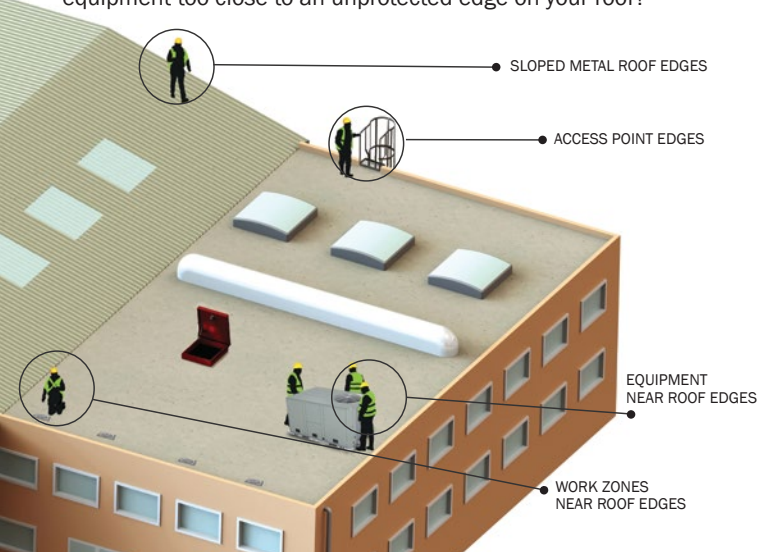
# IDENTIFYING DANGER ZONES: UNPROTECTED EDGES

## Protecting the Perimeter

When access to the entire roof is authorized, the safest, most comprehensive solution is a perimeter railing system that surrounds and protects all roof edges.

## Unprotected Edges

The edge of the roof is the most visible hazard, and typically the hazard most people want to protect first. Proximity to the roof edge is a significant factor in identifying the probability of an accident occurring. OSHA Code states that if a worker can be exposed to a fall, then they must be protected. Frequently, a worker's purpose for accessing the roof is to service a piece of equipment. Is the equipment too close to an unprotected edge on your roof?



## Spotting Hazards on the Roof

### Roof Edges:

OSHA Code: 1910.28(b)(13)

### Use Multiple Solutions to Secure the Perimeter

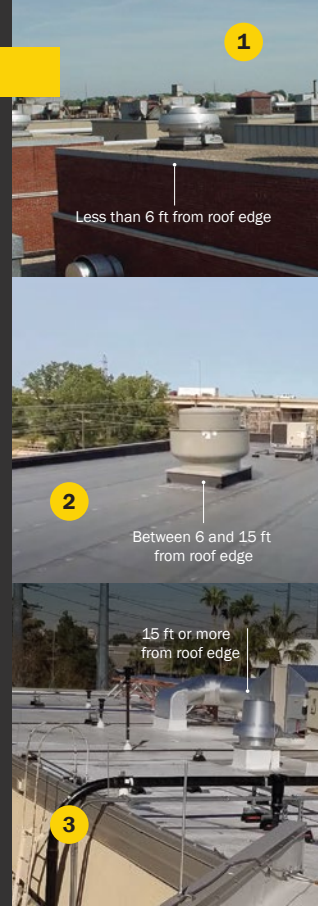
Every rooftop is different. Using a hybrid guardrail system to protect workers from the frequent and infrequent hazards will provide OSHA compliance and peace of mind on the rooftop.

### Zone Defense: Unprotected Edges

When work is performed less than 6 feet (1.8 m) from the roof edge, OSHA allows for employers to protect its people by using a by a guardrail system, safety net system, travel restraint system, or personal fall arrest system.

When work is performed at least 6 feet (1.8 m) but less than 15 feet (4.6 m) from the roof edge, OSHA allows a guardrail system, safety net system, travel restraint system, or personal fall arrest system. The employer may use a designated area when performing work that is both infrequent and temporary.

When work is performed 15 feet (4.6 m) or more from the roof edge, the employer must protect each employee from falling by a guardrail system, safety net system, travel restraint system, or personal fall arrest system or a designated area.



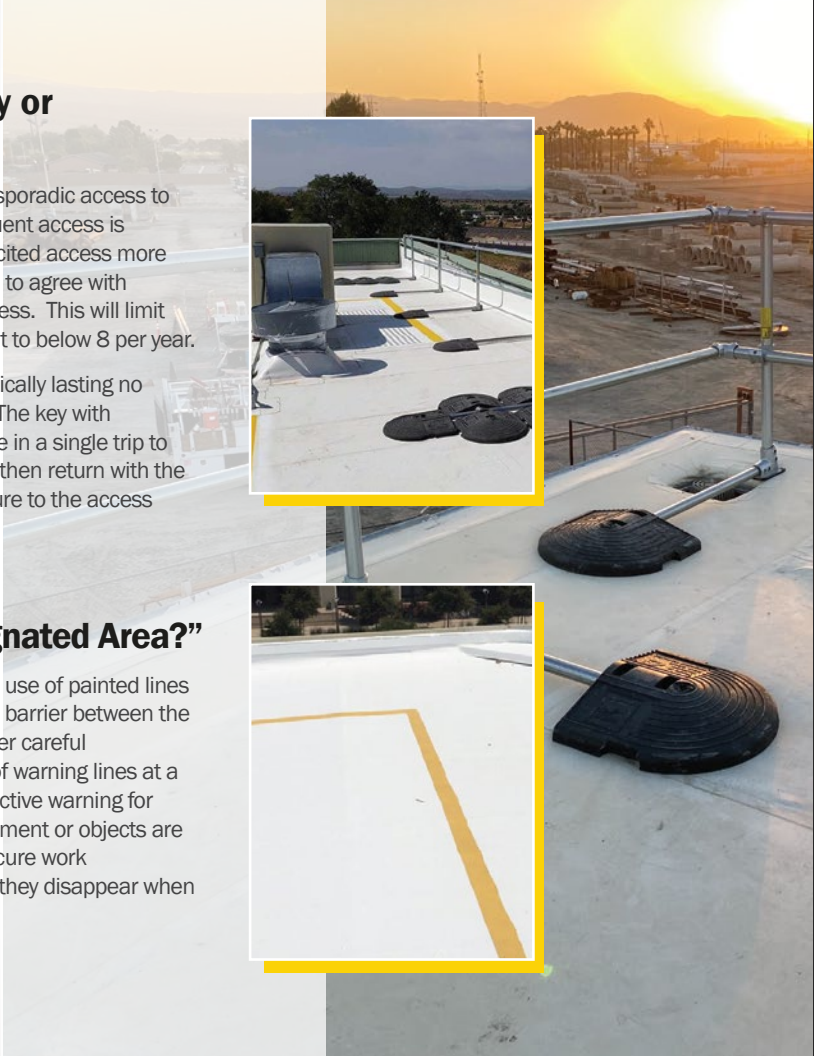
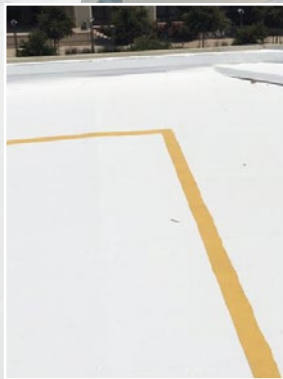
## How does OSHA define temporary or infrequent rooftop access?

**Infrequent access:** The work must involve occasional or sporadic access to the surface rather than regular or routine access. Infrequent access is typically in response to a breakdown. Federal OSHA has cited access more than once per month as frequent, but safety experts tend to agree with CAL-OSHA that infrequent should be once per quarter or less. This will limit the number of hazard exposures through the access point to below 8 per year.

**Temporary work:** The work must be of short duration, typically lasting no longer than a "an hour or 2" according to Federal OSHA. The key with temporary work is that the task is simple and can be done in a single trip to the work area, no diagnostic or assessment process and then return with the tools required to complete the work. This reduces exposure to the access point hazards and leading edge hazards by half.

## Can I use a painted line as a "Designated Area?"

**Simply put: No.** OSHA safety guidelines do not permit the use of painted lines for "Designated Areas." Instead, OSHA requires a physical barrier between the worker and the leading edge. This decision was made after careful consideration, prioritizing worker safety and the visibility of warning lines at a height between 34 to 39 inches. This height ensures effective warning for workers approaching designated areas, even when equipment or objects are nearby, minimizing potential hazards and promoting a secure work environment. The primary issue with painted lines is that they disappear when covered with snow, dust, or debris.



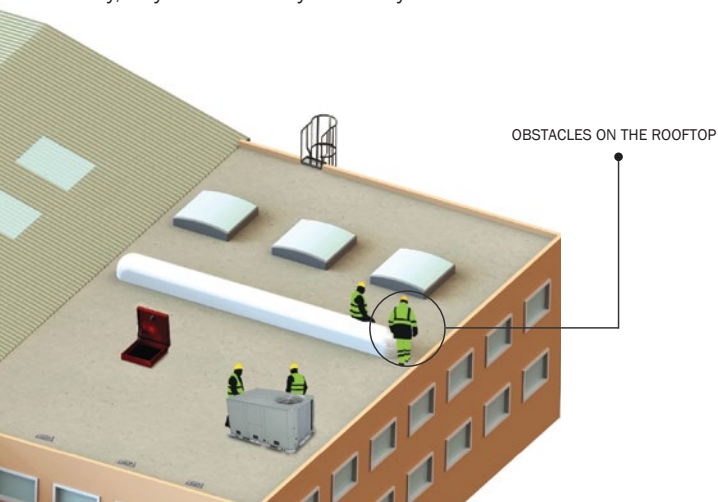
# IDENTIFYING DANGER ZONES: OBSTACLES ON THE ROOF

## Obstacles on the Rooftop Hinder Access to Work Zones

Rooftop safety includes providing a safe and efficient path across the rooftop to reach drains, HVAC units or other equipment that requires maintenance. Hazards include obstructed routes and changes in roof level where slips, trips and falls are likely.

## Rooftop Obstacles

Understanding the path your workers take across the roof is necessary for a complete fall protection assessment. Obstacles on the roof force workers to unsafely climb over or step around the obstruction, often placing workers at risk by walking too close to the roof edge. If you would not allow a trip and fall hazard inside your facility, why allow one on your facility?



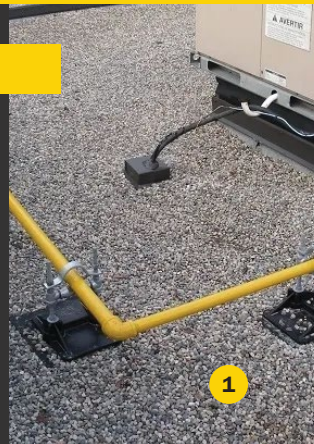
OSHA General Duty Clause: Section 5(a)(1)

## Safe Access Over Rooftop Obstructions: Spotting Hazards on the Roof

Each employer must furnish to each of its employees a workplace that is free from recognized hazards that are causing or likely to cause death or serious physical harm.

### According to a 2018 US Department of Labor report:

- Slips, trips & falls make up majority of general industry accidents.
- 15% of all accidental deaths are the result of slips, trips and falls.
- They are the 2nd leading cause of death at 12,000 per year



## 1 Pipe work and Other Low Roof Obstacles

Rooftop trip hazards, including water, ammonia, and conduit lines, pose risks. Same-level falls on roofs present challenges for safe evacuation, making it crucial to address these hazards with suitable safety measures.

## 2 Objects and Obstructions on the Rooftop

Rooftop dangers arise from large barriers, posing two risks. Firstly, workers face fall accidents and equipment damage when climbing over obstructions. Secondly, obstacles may compel workers to approach the leading edge unnecessarily, increasing the risk of accidents.





## How are crossover stairs integrated into a fall protection plan?

Crossover stairs create a safe walking path in the middle of the roof, where employees may have previously been forced to walk near the roof edge to navigate around obstacles. By providing a designated pathway, these stairs significantly reduce the likelihood of falls and accidents. With anti-slip features and handrails, workers can safely move across elevated areas, ensuring a safe walking path across the roof. By eliminating the need to climb over equipment, you eliminate the possibility of a slip-and-fall hazard on the roof.



## What are the most common slip hazard found on commercial roofs?

Common slip hazards on commercial roofs include wet surfaces from rain or condensation, debris accumulation, algae growth, uneven surfaces, poor drainage, steep slopes, and inadequate lighting. Regular inspections, maintenance, and proper safety measures are essential to mitigate these hazards and ensure a safe working environment. In our experience, sloped metal roofs with snow, white PVC, water, or ice present are particularly dangerous slip hazards.





# “

## We Identify Danger Zones on Your Roof

Kee Safety Fall Protection Experts perform a critical analysis of the entire rooftop surface to identify the hazards where workers are exposed to the greatest risk. This ensures that the most dangerous areas are protected immediately with state-of-the-art fall protection systems and OSHA compliant solutions.



**Schedule a Free Rooftop Safety Audit**

[keesafety.com/safetyaudit](https://www.keesafety.com/safetyaudit)

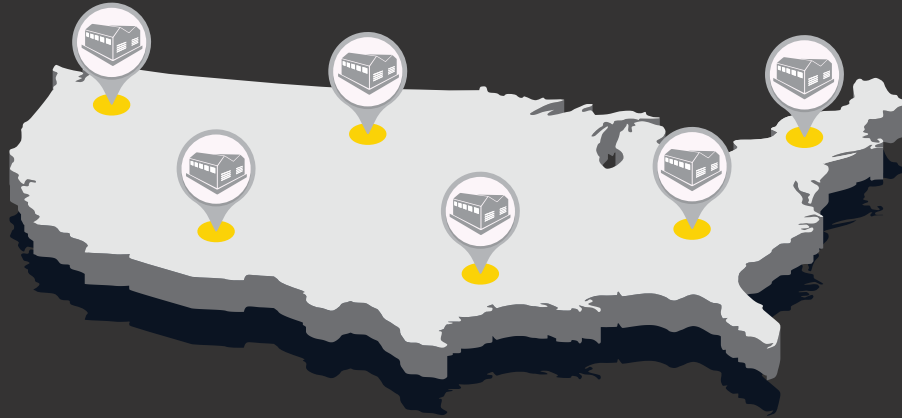


# YOUR TRUSTED SAFETY PARTNER

## **SAFETY WITHOUT COMPROMISE:**

### **KEEP SAFETY'S COMMITMENT TO SEPARATING PEOPLE FROM HAZARDS**

We take immense pride in engineering, manufacturing, and supplying trusted fall protection solutions, safety railing systems, and safe access equipment for working at height.



## **MULTIFACILITY ACCOUNTS PROGRAM**

**We have the capability to manage multiple rooftop safety systems on a state or national level.**

- Risk assessments and hazard mitigation strategies for all your facilities
- Standardization of fall protection solutions across all locations
- Our solutions can be bundled for maximum efficiency and cost savings
- A single point of contact for your national or multifacility account

## Kee Safety: Your Fall Protection Experts

Kee Safety is the leading expert and global manufacturer of safety components and fall protection systems. We are fully committed to **Separating People from Hazards**. Established in 1934, Kee Safety has a proud history of engineering, manufacturing, and supplying the most trusted fall protection solutions, safety railing systems, and safe access equipment for working at height.



S E P A R A T I N G   P E O P L E   F R O M   H A Z A R D S

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