Kee® Safety

SEPARATING PEOPLE FROM HAZARDS

Safety Compliance on the Rooftops of Colleges and Universities

MEETING HIGHER STANDARDS FOR FALL PROTECTION WITH A ROOFTOP SAFETY AUDIT

THE ROOF

Rooftop Fall Protection on Campus

Separating Students from Hazards

Roof access points, skylights, edges, and obstructions are high-risk zones. Every building on your campus where maintenance, repairs or inspections are required must have fall protection for your workers.

While there are many fall protection solutions for maintenance roof workers at schools, colleges and universities, we believe that it is imperative for institutions to consider either eliminating the hazards completely (where practical) or installing a collective fall protection system to secure all rooftop activities.

Not only for workers. Through our extensive field experience while performing Rooftop Safety Audits at campus locations, we have seen many roofs littered with remnants of college students who have broken onto the roof to access the view, the serenity, or the party.

Investing in Personal Protection Equipment (PPE) such as tie-off points and lifelines will only protect trained workers wearing the correct PPE.

A guardrail system, skylight screen, and other safety-compliant solutions, however, will help protect students and workers alike - regardless of whether rooftop access is authorized.

The information in this report offers an overview of these risks and hazards. A professional safety audit is an important step to provide a system of protection that will separate people from hazards.

ROOFTOP SAFETY AUDIT

A series of incidents where university students have fallen from the rooftops of campus buildings has some colleges rethinking their safety policies.

Contents

A Culture of Safety

Keeping Students and Workers Safe is the Priority of Every University

Of all the dangers facing college students on campus, the chances of falling from a building may seem rather small. However, a recent string of incidents involving students on campuses across the United States[1] who have died or been seriously injured by falling from on-campus buildings, residence halls, off-campus apartment buildings or fraternity houses, has given rise to an interest in rooftop safety and fall protection.

These tragedies tend to force colleges to re-examine their own safety standards, assess risk on and in every building - for students and workers alike - and perhaps fight off lawsuits. In 2014, the Arizona Board of Regents, which oversees state universities, began taking a closer look at student drinking and the safety of off-campus apartments after two students from the state's public colleges accidentally fell to their deaths that year. The incidents compelled the Board to review all student safety issues including building access and rooftop safety[2]

The purpose of a campus-wide Safety Policy is to establish required procedures to control access and maintain security, safety standards, and the integrity of all campus building roofs.

A Question of Liability

Roof Access and Student Safety: High Exposure

In April, 2014, Patricia A.R. Martinez, president of the Association of College and University Housing Officers –International, spoke with Inside Higher Education regarding the concern for student safety.[3] She noted that residence halls are now being designed with more safety issues in mind. “There’s always the concern as far as who has access to roofs,” she said. “You also see many more facilities now that are built without balcony access.”

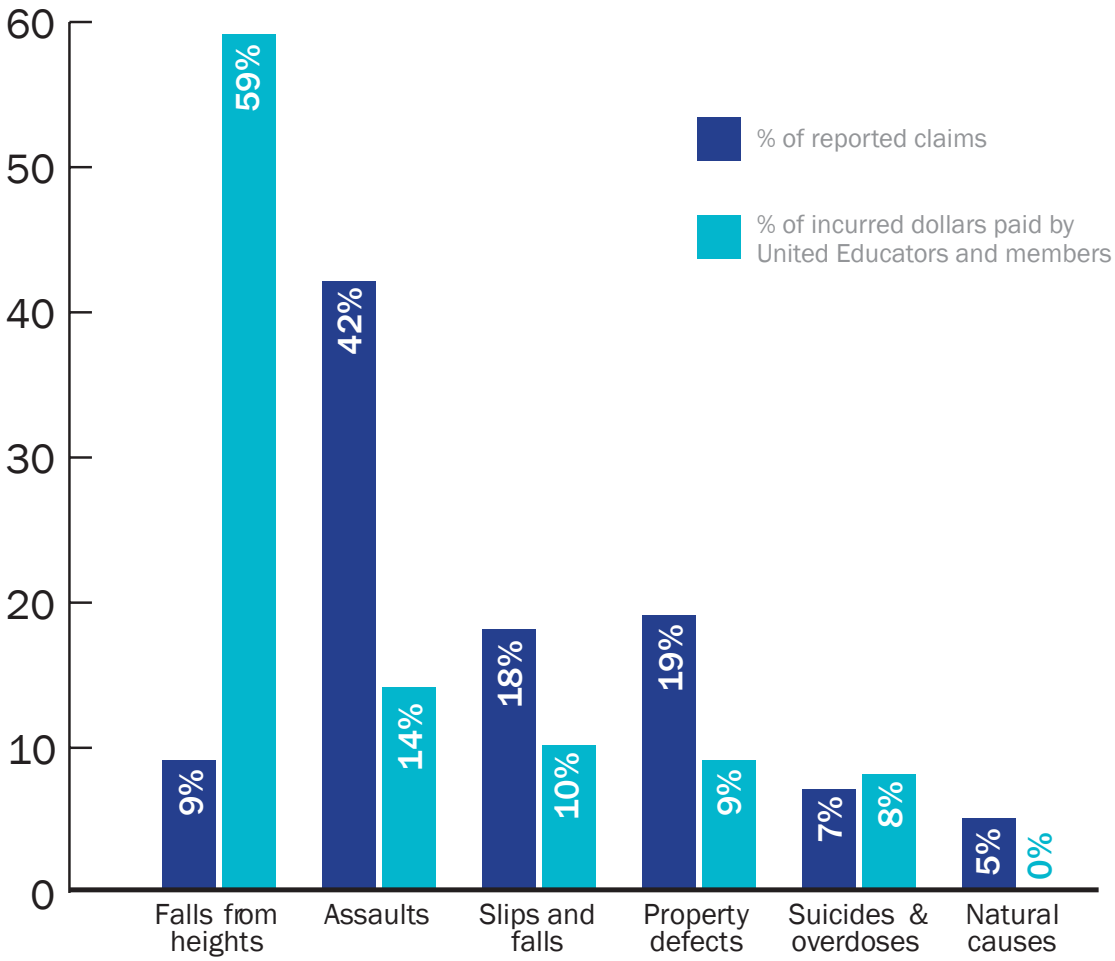
Colleges have started retrofitting more dorms to get up to local safety codes over the past decade, said Brett A. Sokolow, president and chief executive officer of the NCHERM Group, a law firm and consulting group for colleges.[4] Many of those upgrades are relatively low-cost, but colleges still have to work to curb the potential for falls when student drinking happens in high-rise residence halls. “For campuses that allow students to congregate on those balconies, their lawsuit is just around the corner,” he said.

United Educators, a higher education risk management group, found that falls from heights made up 9 percent of the more than 500 claims that stemmed from injuries in residence halls between 2003 and 2007. That small proportion of claims, however, still made up 59 percent of what colleges paid out in total from the claims, which included assaults and overdoses in residence halls.[5]

A Question of Liability

Reported Causes and Incurred Dollars of Residence Hall Injuries

Although falls of one kind or another represented about one quarter of the most common claims, falls from heights accounted for almost 60 percent of the monetary losses.



OSHA Sets the Standards

Roof Access and Personnel Safety: High Exposure for Students and Workers

All colleges and universities have established standard procedures to control access and maintain security, safety standards, and integrity of their campus building roofs. Authorized personnel have access to these areas to maintain the roof system and equipment housed there and to meet housekeeping standards outlined by the National Institute for Occupational Safety and Health (NIOSH).[6]

Under OSHA safety classifications, many areas on a building's roof are considered hazardous with the potential to cause injury when not properly protected and/or when workers are lacking knowledge of safe access procedures.

On any rooftop within the school property, air handling units, HVAC systems, conduit and drains require maintenance and repair. These and other applications commonly found on most college campuses find service personnel working at heights on a regular basis. In addition to protecting maintenance personnel and complying with OSHA fall protection regulations, there is a need to protect students should they gain access to the rooftop.

Fall protection systems must often blend in with existing building designs and there is always the fear of students using ladder systems to access campus rooftops. Balancing these various considerations
In order to maintain the safety of maintenance workers and the student population requires partnering with an experienced safety company who specializes in fall protection and understands the unique nature of OSHA compliance as it applies to college campuses.

OSHA updated the federal regulations regarding rooftop safety in January, 2017.[7] The new compliance codes have a major impact on implementing and maintaining a compliant fall protection program on all universities in the United States. It is critical for school facility maintenance professionals to understand how the new OSHA regulations effect campus safety. However, the OSHA documentation is more than 500 pages!

In the following sections, we have outlined the top 4 hazards to protect on every campus rooftop. This will provide an easy-to-understand risk assessment followed by tested and compliant safety solutions to separate people from hazards.

OSHA®
https://www.osha.gov/

National Institute for Occupational Safety and Health NIOSH
https://www.cdc.gov/niosh/

ASSESS RISK

How to Assess Risk on the Rooftop

Only a fall protection expert should perform a critical analysis on the rooftops on your campus to strategically identify the hazards where your workers and students are exposed to the greatest risk. This ensures that the most dangerous areas are protected immediately with state-of-the-art systems and OSHA-compliant solutions.

A prioritized approach based on the critical danger exposure and how frequently each hazard is accessed by workers who need to perform regular maintenance to rooftop equipment. Outlined in this document is a basic approach. Every roof must be reviewed by a Rooftop Safety Audit expert as each site is unique and your specific roof may require variable solutions.

The Big Four:

1. **Access Points**
2. **Rooftop Openings**
3. **Unprotected Roof Edges**
4. **Rooftop Obstacles**

Roof access areas must be secured at all times. Security is essential for student safety, worker safety and for the protection of the roof system. Access to campus building roofs must be restricted to authorized personnel only.

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

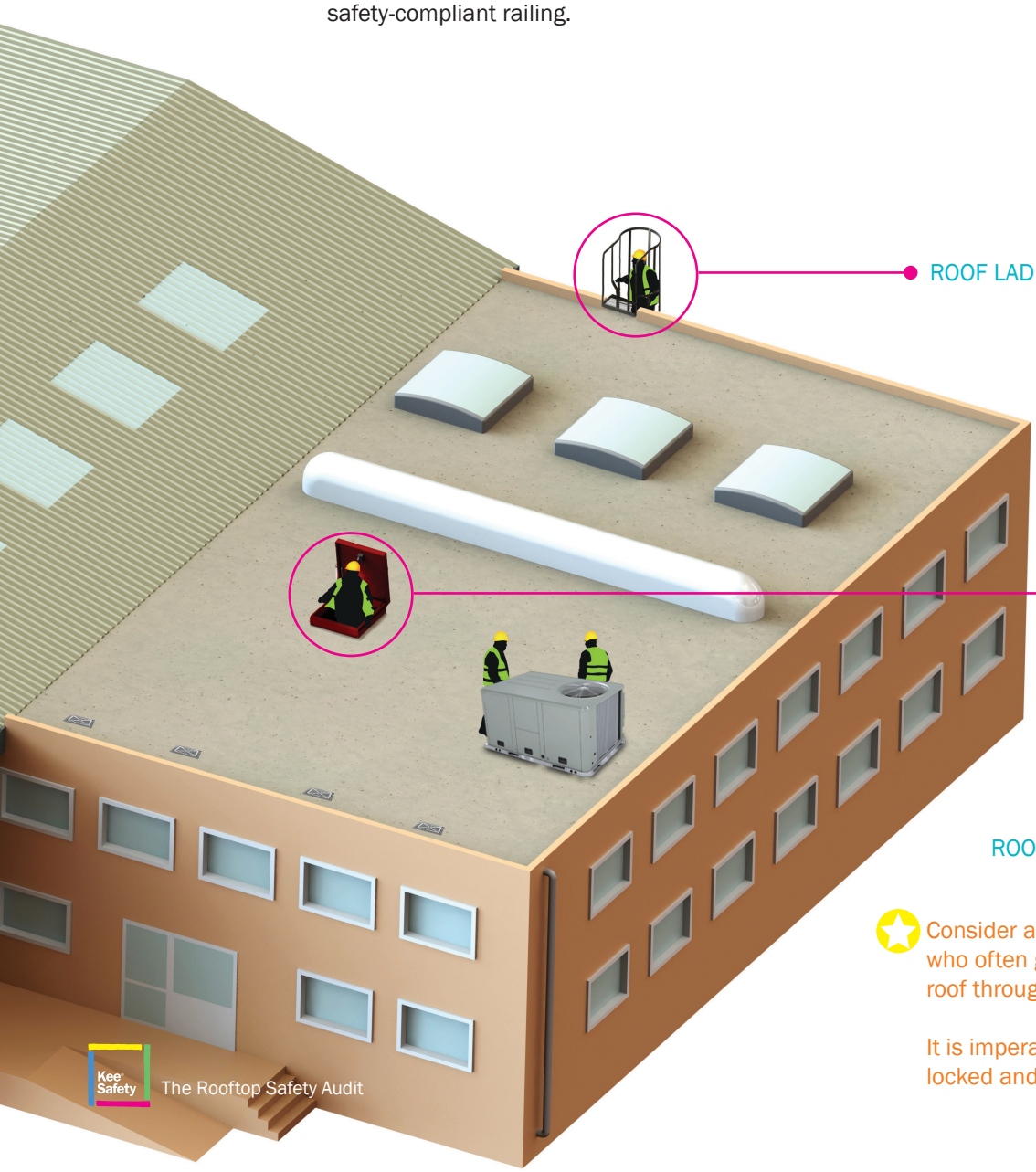
Identifying Danger Zones: Roof Access

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.

1 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 should be secured with a self-closing gate and safety-compliant railing.



Consider access points as a risk for students who often gain unauthorized entry onto the roof through these unprotected ingress points.

It is imperative that all access points are locked and routinely checked for vandalism.

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

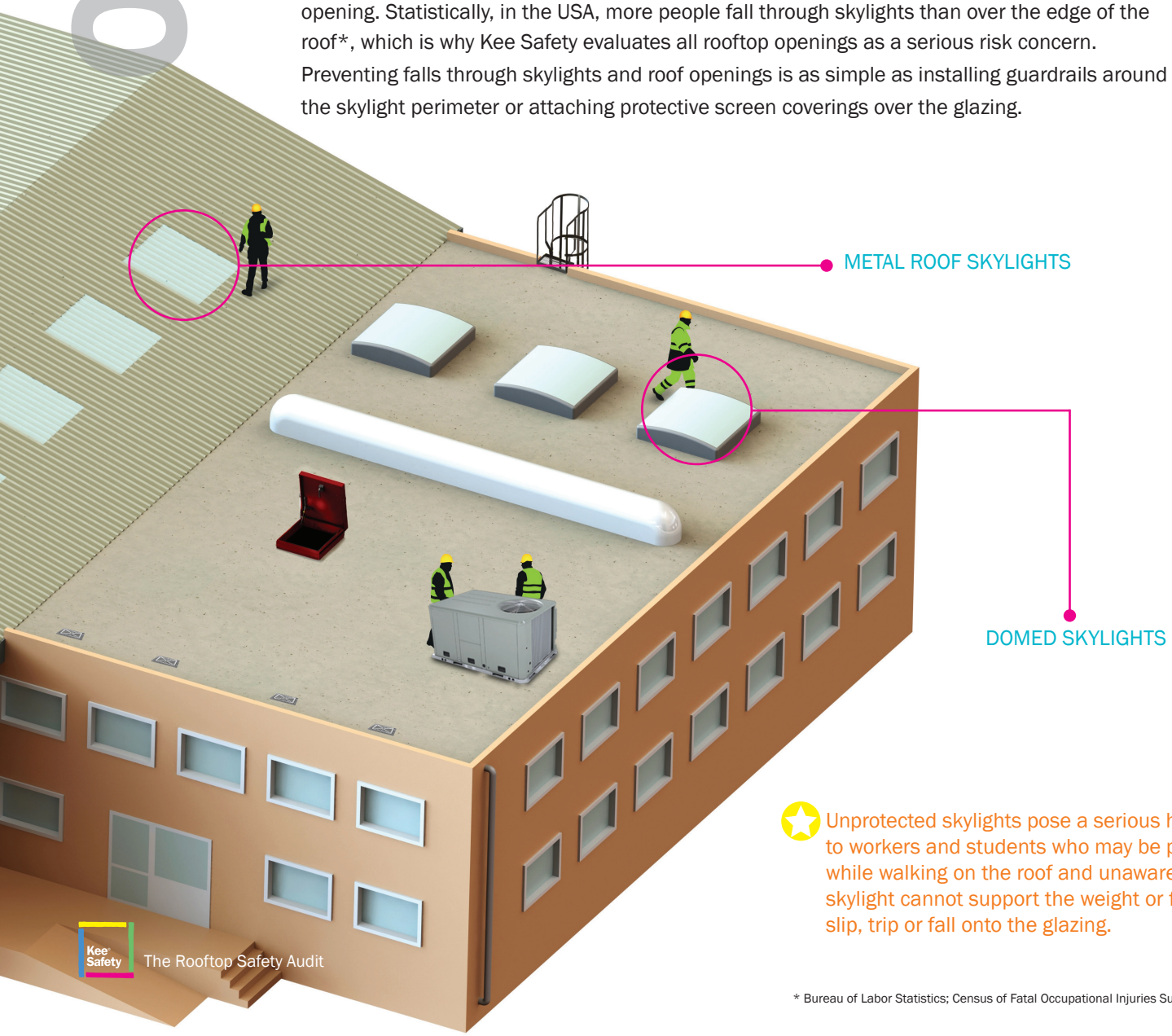
Identifying Danger Zones: Holes in the Roof

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 fixed standard railing on all exposed sides.

2 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.



Unprotected skylights pose a serious hazard to workers and students who may be preoccupied while walking on the roof and unaware that the skylight cannot support the weight or force of a slip, trip or fall onto the glazing.

* Bureau of Labor Statistics; Census of Fatal Occupational Injuries Summary, 2017

OSHA Code: 1910.28(b)(13)

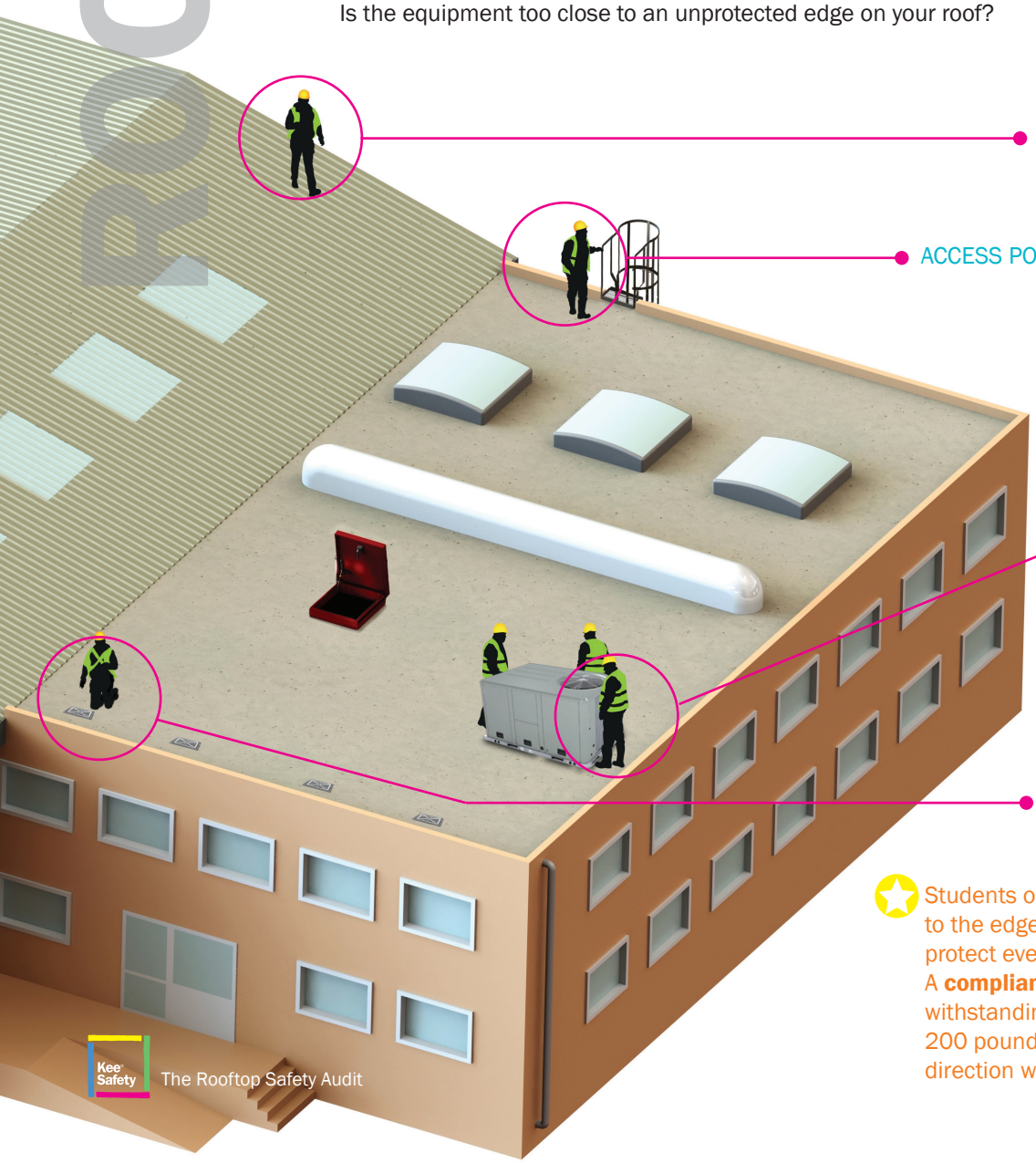
Identifying Danger Zones: Roof Edges

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.

3 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?



Students on the rooftop will be carelessly lured to the edges. A guardrail system would collectively protect everyone on the roof - authorized or not. A **compliant** guardrail system must be capable of withstanding, without failure, a force of at least 200 pounds applied in a downward or outward direction within 2 inches of the top edge.

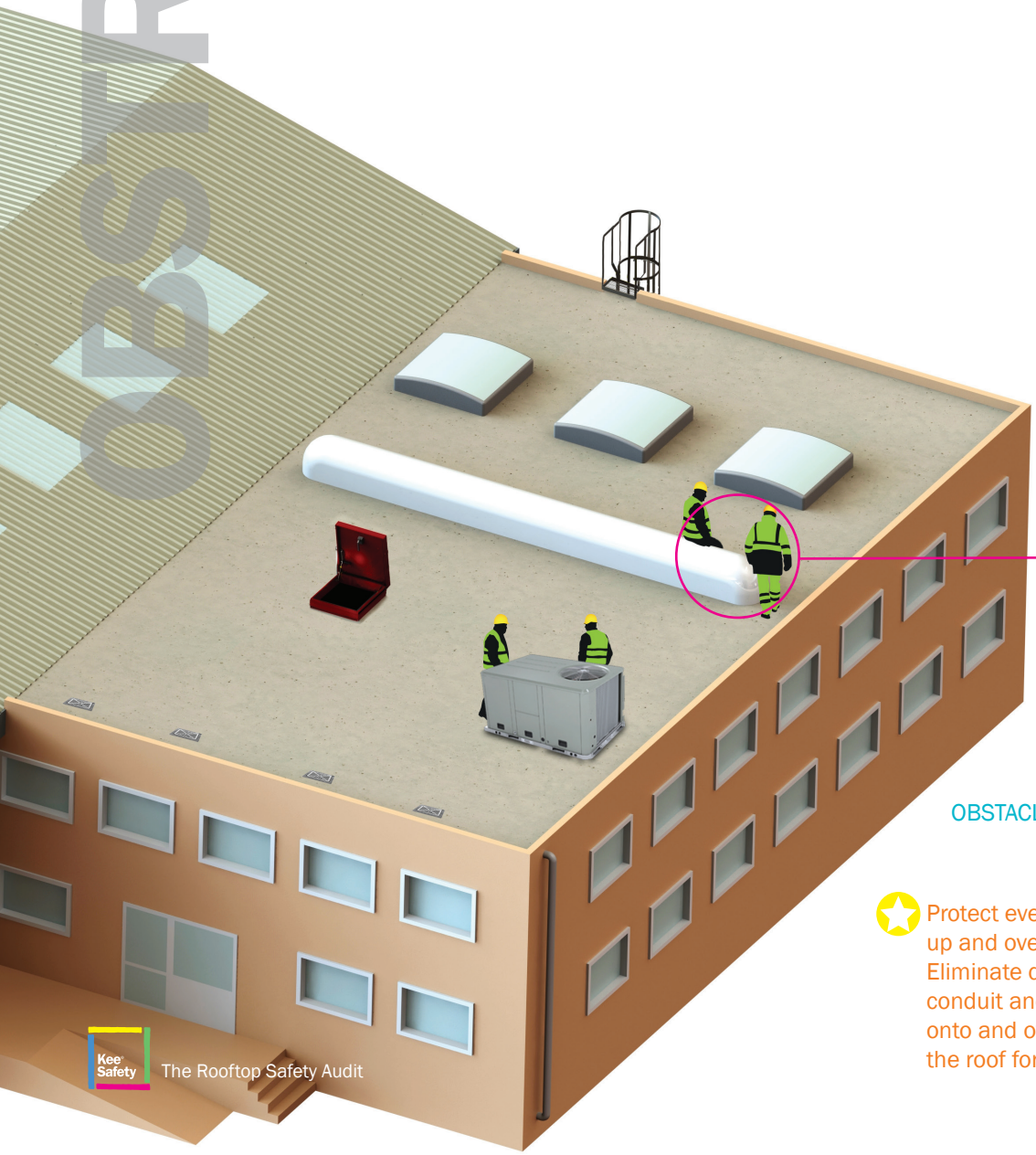
Identifying Danger Zones: Rooftop Obstructions

Obstacles on the Rooftop often 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.

4 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.



OBSTACLES ON THE ROOFTOP

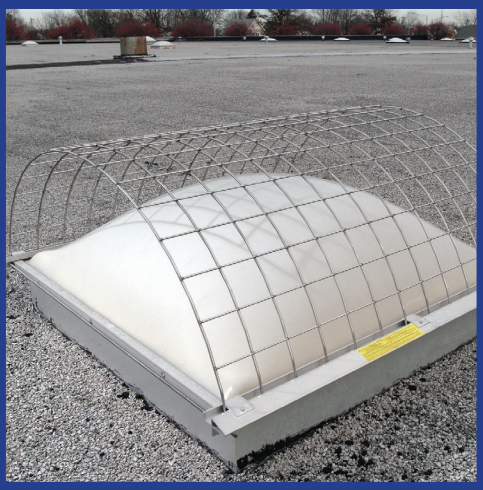
Protect everyone by providing safe access up and over these obstacles on the roof. Eliminate damage to expensive ductwork, conduit and HVAC systems incurred by climbing onto and over this equipment when traversing the roof for maintenance or inspection.

AUDIT

The Rooftop Safety Audit

A Professional Rooftop Safety Audit Provides:

- A prioritized list of areas on the roof that are deemed “critical” by OSHA
- A detailed action plan for protecting rooftop hazards
- A customized solution that fits the exact needs of the facility
- A documented fall protection presentation to communicate to peers, upper management, or a budget approval board that outlines the roof requirements and fall protection solutions
- An organized budget and estimate of the installation
- A coordinated plan to detail compliance for local, state and federal inspectors



SAFETY

The Hierarchy of Fall Protection

Smarter Solutions for Rooftop Safety

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.

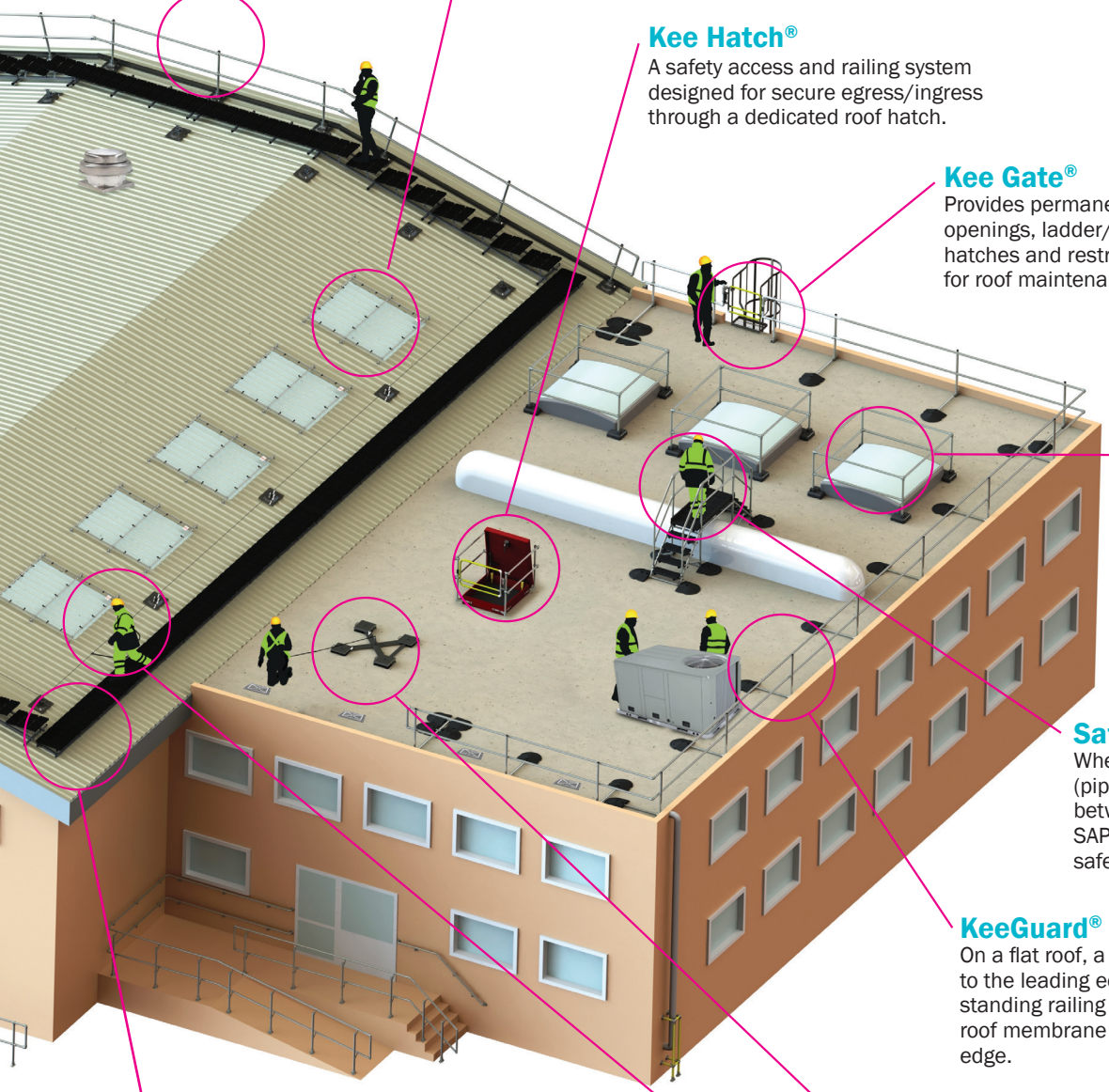
Using an Integrated Solution:
A Complete Rooftop Fall Protection System

KeeGuard® Topfix
Non-penetrating guardrail for all metal roof types including standing seam and metal profile for safety at the highest level.

KeeGuard® Skylight Screen
Skylights are considered a hole in the roof - an OSHA safety hazard. The unique construction and mounting design allow the KeeGuard Skylight Screen to be attached without penetration, maintaining the integrity of the roof and the skylight.

Kee Hatch®
A safety access and railing system designed for secure egress/ingress through a dedicated roof hatch.

Kee Gate®
Provides permanent protection for any openings, ladder/stair access points, roof hatches and restricted areas, where access for roof maintenance is required.



Kee Dome®
A free-standing, modular solution deployed around skylights, roof lights and dome lights, allowing access to rooftops without the hazard of falling through glazed areas.

Safe Access Platform [SAP]
When obstacles exist on the rooftop (piping, ventilation systems, partitions between buildings or level changes) SAPs an be custom designed to provide safe access over those hazards.

KeeGuard®
On a flat roof, a protected perimeter limits access to the leading edge. Installing a modular, free-standing railing system that does not penetrate the roof membrane provides a safe barrier to the roof edge.

Kee Walk®
On a standing seam metal roof, or metal profile roof, a level walkway system provides a safe, anti-slip surface to avoid tripping over the seams, crowns and valleys.

Kee Walk® with Guardrail
Kee Walk with integrated Guardrail provides sturdy handrail support securely attached to non-slip treads for dependable foot traction and balance where roof surfaces are uneven or slippery.

Kee Anchor® Weightanka
A modular, dead-weight anchor fall prevention system, used with personal fall protection equipment, allows for safe freedom of movement around the roof space.

KeeLine® Horizontal Lifelines
Horizontal safety lines provide continuous protection when working at heights. Our 39-foot system accommodates up to 3 users and can be mounted either directly onto the roof surface or on to the building structure.

OSHA COMPLIANCE

OSHA Industry Standards

OSHA standards have been updated to reflect industry fall protection requirements. Fall Protection OSHA standards are central to the use of this Rooftop Safety Audit.

Discussions on roof safety can be overwhelming regarding OSHA regulations, inspections, and regional standards. Kee Safety can assist you with a full understanding of the OSHA codes that are applicable to your specific rooftop safety concerns.

1

Access Points: 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.*

2

Rooftop Openings: 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

3

Unprotected Edges: 1910.28(b)(13)
When work is performed less than 6 feet (1.6 m) from the roof edge, the employer must ensure each employee is protected from falling by a guardrail system, safety net system, travel restraint system, or personal fall arrest system.

When work is performed at least 6 feet (1.6 m) but less than 15 feet (4.6 m) from the roof edge, the employer must ensure each employee is protected from falling by using 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.

The employer is not required to provide any fall protection, provided the work is both infrequent and temporary; and implement and enforce a work rule prohibiting employees from going within 15 feet (4.6 m) of the roof edge without using fall protection in accordance with paragraphs (b)(13)(i) and (ii) of this section.

CASE STUDIES

Kee Safety Case Studies

1

Yale New Haven Hospital

Located New Haven, Connecticut, Yale New Haven Hospital consistently ranks among the best hospitals in the United States. The Hospital is made up of a series of new and old buildings. Some of the buildings were originally built in 1900. This project called for reliable rooftop fall protection on 11 separate structures.

Kee Safety performed a full rooftop safety assessment and engineered a fall protection solution that included KeeGuard® and KeeGuard® Contractor for roof perimeter safety, Skylight Screens and Kee Dome for skylight protection, and Ladder Access Kits for a completely integrated rooftop fall protection system.

2

Mississippi University Stadium Rooftop: Dudy Noble Field

Our challenge was to provide a rooftop fall protection system that allows the workers to safely walk the roof of the mezzanine to access field lights and maintenance equipment.

Our solution: KeeLine® Horizontal Lifeline System. Selected for its reliable performance, ease of installation and cost-effective solution. The KeeLine® horizontal lifeline system is designed to provide workers with freedom of movement on the rooftop while securely attached to the lifeline at all times.

3

Cornell University: College of Agriculture and Life Sciences

Prior to a re-roofing initiative at Cornell University, the architect for the project determined that the height of the parapet was not sufficient to meet OSHA code. The height requirement for railings on roof edges, including rooftops with parapet barriers, must be 42 inches plus or minus 3 inches (39-45 inches) above the walking or working level.

To become compliant, we installed KeeGuard® parapet safety railing around the top of the perimeter wall, reducing risk while avoiding penetration of the roof membrane.

ABOUT

Kee Safety: Your Fall Protection Experts

The early history of Kee Safety is closely linked to the dairy industry in England in the late 1920's. Mr. George H. Gascoigne, owner of a thriving dairy farm in Reading, Berkshire, became interested in the growing market for the mechanical milking of dairy cows.

As his farm grew and milk production expanded, it became increasingly apparent that the old style wooden cow stalls must be replaced with steel railing to maintain hygienic production and simplify the milking process. However, welding together guardrail in a wooden barn full of straw was not suitable.

The idea was born of a cast metal fitting, with an integral boss for a grub screw, that could be quickly locked onto the railing tube using a simple Allen key. The first casting drawings of a Kee Klamp® were produced in August of 1934.

It soon became apparent that there was a much wider scope for Kee Klamp® fittings. During WWII, large contracts were undertaken for the war effort, because the versatile Kee Klamp® lent itself to the construction of aircraft maintenance platforms, gun turret maintenance racks and test firing stands.

At the end of the war, Kee Klamp® expanded into overseas markets eventually leading to the establishment of our own distribution companies across Europe, Canada (Kee Safety, Ltd.) and the USA (Kee Safety, Inc.).

In the 70's, new young designers engineered innovative ways to use the Kee Klamp® modular concept to develop new applications for the component-based system including barrier guardrail for rooftops and ground-based safety rail solutions.

Today, Kee Safety, Inc. is the leading expert and global manufacturer of safety solutions. We have a proud history of separating people from hazards by engineering, testing, manufacturing and installing fall protection systems that exceed OSHA standards. We provide world-class customer service, trusted solutions and we lead the industry in new product development.

Thank you for considering Kee Safety as your rooftop safety expert.

NOTES

Notes and References

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CONTACT

Benefits of a Rooftop Safety Audit with Kee Safety

- We provide you with a detailed action plan, prioritizing the areas deemed as “critical”
- Our experts create a customized solution that fits the exact needs of your facility
- Kee Safety fully documents your fall protection requirements for presentation to your peers, upper management, or budget approval board
  - Organizes your budget requests
  - Presents a coordinated plan to inspectors
- Only Kee Safety offers a solution-designed proposal using products that:
  - Will not puncture your roof, cause roof leaks, or void your roof warranty
  - Are third-party tested to meet all Provincial Standards and Territorial Codes
  - Are extremely long-lasting (20-30 year life expectancy)
  - Many products can be easily installed by your crew or local contractor

Hierarchy of Fall Protection

It’s About the Partnership: Depend on Kee Safety to Reduce Risk

You have a trusted partner in the field. Our experts walk the roof with you to assess the hazards, and discuss the best combination of products and systems to mitigate the risk of injury to your workers. Kee Safety, Inc. uses the Hierarchy of Fall Protection to guide you in this process. Originated to support OSHA regulations, the goal is to expertly evaluate, provide a comprehensive plan, and install a rooftop solution to successfully and safely separate people from hazards.

Installation

You can rely on Kee Safety and our worldwide network of certified installers to ensure compliance with all major standards and regulatory requirements. Our dedicated technical service team can provide a turn-key solution including on-site analysis, professional installation, advise on project costs and manage deadlines.

Contact one of our qualified Fall Protection Experts and schedule a rooftop safety assessment today!

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