DESIGNING
SAFETY SOLUTIONS

Tremco Roofing and Building Maintenance
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This course is a review of rooftop safety, hazards, laws and codes. The aim is to develop and reinforce general awareness of the risks that can be alleviated with properly designed rooftop safety solutions.
At the end of the this course, participants will be able to:

- Identify the rooftop safety hazards.
- Have an understanding of various laws and codes around rooftop safety.
- Discuss hierarchy of fall protection.
- Develop design solutions to protect against safety hazards.
Of work related fatal falls, **50% involved roofs, scaffolds, ladders and stairs**.

**SOURCE:**
FALLS

THE U.S. DEPARTMENT OF LABOR

• Falls are one of the leading causes of traumatic occupational death.
• Falls account for nearly 10% of all traumatic occupational deaths
• Deaths by Falls:
  • 41% through skylights
  • 59% through roofs or roof openings
OSHA BASICS

Occupational Safety and Health Administration

Responsible for worker safety and health protection
1910 – General Industry Standards

- 4 foot fall protection standard (1910.23 (b) (c))
- Typically apply to the building owner and roof activities (HVAC, maintenance, etc.)

1926 – Construction Industry Standards

- 6 foot fall protection standard (1926.501 (b) (1))
- Typically apply to the employer of the employee working on the roof
ROOF ACCESS

• How are we accessing the roof?
• Does it comply with code?
• Is it in good repair?

Roof openings
1910.23(a)(1) through 1910.23(a)(10)

Guardrail systems
OSHA 1910.23 (e) (9)
ROOF OPENINGS

• Skylights – Do they have screens?
• Smoke Vents – Do they have guardrails?
• Any other openings or elevation changes?
• Any risk of falling tools or equipment?

Roof Access (guardrails, skylight screens)
OSHA 1910.23 (a) (8)

Skylight screens
OSHA 1910.23 (e)
UNPROTECTED EDGES & OPEN SIDES

- Are guardrails or parapets taller than 39” or guarding the walkway?
- Special considerations for guardrails:
  - Visual considerations
  - Security or control of rooftop access

Unprotected sides and edges (perimeter railings):
1910.23(c)(1) through 1910.23(c)(3)
SUMMARY

Fully compliant Safety Systems for unprotected edges and open sides, roof openings, and walk ways.
Elimination
Collective Fall Protection
Restraint
Fall Arrest
Other Acceptable Systems

OSHA SUGGESTS:
• Design out risk
• Collective Protection
• Active Fall Protection
HIERARCHY OF FALL PROTECTION

DESIGN OUT RISK
Relocate equipment from roof to ground level
HIERARCHY OF FALL PROTECTION

COLLECTIVE PROTECTION

- Limited or no training
- Protects everyone accessing the roof
- Will protect individuals and groups
- Passive protection: Always on
- Maintenance free
- Fall Prevention
PERSONAL FALL PROTECTION

HIERARCHY OF FALL PROTECTION

ACTIVE FALL PROTECTION

Fall Restraint
• Training required
• Will protection up to two uses
• Annual maintenance required

Fall Arrest
• Training required
• Will protect up to two users
• Annual maintenance required
• Rescue plan required
COMPLIANCE

Caution: Do not enter
<table>
<thead>
<tr>
<th>Violation</th>
<th>Fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other than Serious</td>
<td>up to $12,934</td>
</tr>
<tr>
<td>Serious</td>
<td>$12,934</td>
</tr>
<tr>
<td>Willful</td>
<td>$129,340</td>
</tr>
<tr>
<td>Repeat</td>
<td>$129,340</td>
</tr>
<tr>
<td>Failure to Abate</td>
<td>up to $TBD!! – calculated per day of delay</td>
</tr>
<tr>
<td>Willful and Fatality</td>
<td>$750,000 + criminal charges</td>
</tr>
</tbody>
</table>

“Business Leaders must know that DOL is turning over cases to DOJ (for criminal prosecution) because business leaders must know that the consequences for breaking the laws protecting US workers will not be only dollars...”

- Alexander Acosta, Secretary of Labor 2018 VPP Conference
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Alexander Acosta, Secretary of Labor
IBC, 102.2, OTHER LAWS

“Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.”
IBC, Section 202, Guards

“GUARD. A building component or a system of building components located at or near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to a lower level.”
1015.6 Mechanical equipment, systems and devices.

“Guards shall be provided where various components that require service are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of such components. The guard shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter.”
1015.7 Roof Access.

“Guards shall be provided where the roof hatch opening is located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter.”
Exception: Guards are not required where permanent fall arrest/restraint anchorage connector devices that comply with ANSI/ASSE Z 359.1 are affixed for use during the entire roof covering lifetime. The devices shall be reevaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed not more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from the roof edge or open side of the walking surface.
DESIGN CONSIDERATIONS
Prior to design, consider the following:

- Understand Owners Safety Program
- Company Safety Requirements
- Results of Safety Audit
- Hazard Awareness
DESIGN CONSIDERATIONS

NON-PENETRATING RAILING SYSTEM

- No railing along edge for maintenance work
- No railings on either side of ladder
DESIGN CONSIDERATIONS

NON-PENETRATING RAILING SYSTEM

• A safer working environment

After
DESIGN CONSIDERATIONS

NON-PENETRATING RAILING SYSTEM

- Mechanical unit near unprotected edge

Before
DESIGN CONSIDERATIONS

NON-PENETRATING RAILING SYSTEM

• Protected edge adjacent to mechanical unit
DESIGN CONSIDERATIONS

SKYLIGHT SCREENS

- Skylights: an often overlooked hazard
DESIGN CONSIDERATIONS

SKYLIGHT SCREENS

• A safer working environment
DESIGN CONSIDERATIONS

HATCH RAILS

- Unprotected roof hatch
DESIGN CONSIDERATIONS

HATCH RAILS

- Non-penetrating roof hatch enclosure system
- Roof hatch with service stair complete with hatch rails at fall hazard points
- Safer working environment

After
RESOURCES

National Roofing Contractors Association
www.nrca.net

Sheet Metal and Air Conditioning Contractors National Association
www.smacna.org

Single Ply Roofing Industry
www.spri.org

International Code Council
www.iccsafe.org

FM Global
www.fmglobal.com
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