

**CONSTRUCTION SAFETY DESIGN
SOLUTION #3
DESIGN CATEGORY: ROOF
HAZARD: FALLS FROM ROOF
EDGE
DESIGN SOLUTION: MINIMIZE
NEED TO GO ONTO ROOF OR
NEAR ROOF EDGE**



This design solution reduces the risk of serious falls from a roof edge during the construction and maintenance activities during the life of a building. Falls from roof edge can result in death or serious injury – about 47 fatalities per year [BLS, 2008] are reported.

SOLUTION

Designers should try to minimize the need to go onto a roof and/or near the edge of a roof. Mechanical equipment should be placed at ground level whenever possible. This eliminates the need to go onto the roof during installation and routine maintenance. Roof vents, mechanical equipment, and communication equipment should be located at least 15 feet back from the roof edge. The 15 foot distance reduces the risk of a fall when servicing equipment. Specify permanent guardrails when equipment must be closer to the roof edge. Specify multiple roof anchors to provide convenient tie off points when workers must be near the roof edge.



This photo shows equipment located on a roof. Positioning equipment at least 15 feet back from the roof edge will reduce the risk of falling when installing and servicing the equipment



This photo shows permanent roof anchors. Specifying multiple roof anchors will provide convenient tie off points when working near the edge of the roof.

BACKGROUND INFORMATION

Applicable US Safety Regulations
OSHA Construction standards

1926.501(b)(1) Unprotected sides and edge. Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by the use of guardrails systems, safety net systems, or personal fall arrest systems.

1926.502(b)(1) Top edge height of top rails, or equivalent guardrail system members shall be 42 inches plus or minus 3 inches above the walking/working level.

1926.502(b)(2) Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches high.

1926.502(b)(3) Guardrail systems shall be capable of withstanding, without failure, a force of 200 pounds applied within 2 inches of the top edge, in any outward or downward direction, at any point along the top edge.

1926.502(d)(15) Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed, and used as follows:

- (i) as part of a complete personal fall arrest system which maintains a safety factor of at least two; and
- (ii) under the supervision of a qualified person

1926.502(f) Warning line systems. Warning line systems and their use shall comply with the following provisions:

(1) The warning line shall be erected around all side of the roof work area.

- (i) When mechanical equipment is not being used, the warning line shall be erected not less than 6 feet from the roof edge.
- (ii) When mechanical equipment is being used, the warning line shall be erected not less than 6 feet from the roof edge which is parallel to the direction of mechanical equipment operation, and not less than 10 feet from the roof edge which is perpendicular to the direction of the mechanical equipment operation.

OTHER CONSIDERATIONS

- Try to specify roof materials that do not require frequent inspections
- Position gutters so that they can be cleaned using cherry pickers or other safe access areas
- Specify durable seals at roof penetrations to minimize the need for reactive maintenance
- Consider designing roof parapets, at least 39 inches high, to serve as permanent guardrails along the roof edge. Additional snow load on the roof structure should be considered when considering parapets.

LIFE CYCLE SOLUTION BENEFITS

- Eliminating the need to go onto a roof and/or near a roof edge can reduce maintenance costs during the life cycle of the building since fall protection or warnings lines would not be needed.

Through the OSHA Alliance Program's Construction Roundtable, the Roundtable participants developed this product for informational purposes only. It does not necessarily reflect the official views of OSHA or the U.S. Department of Labor.