

## ELEVATED WORK SURFACES

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### Scope

This SOP summarizes current standards for protecting employees from falls from elevated surfaces of four feet or more such as excavations, pits, unprotected edges, roofs, ramps, etc., and when working at any height above dangerous equipment (e.g., pickling tanks, machinery, etc.). OSHA's construction standard<sup>1</sup> specifies a trigger height of six feet, while the general industry standard<sup>2,3</sup>, specifies a trigger height of four feet. This SOP also addresses protection of employees from objects falling from elevated work surfaces. Refer to the EHS SOP, **Personal Fall Arrest Systems** for additional specific information.

Following are beyond the scope of this SOP and are addressed specifically in other EHS SOPs and/or regulatory standards.

- Portable and fixed ladders
- Entertainment stages
- Scaffolding
- Mobile aerial lifts
- Manlifts and powered platforms
- Cranes and derricks
- Staircases
- Rolling stock (rail operation)
- Motor vehicles
- Telecommunications and electrical power generation, transmission, and distribution installation
- Steel erection work
- Erection of tanks
- Climbing work
- Dockboards (bridge plates)
- Repair, service, and assembly pits

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<sup>1</sup> OSHA's construction standard applies to any work activity that is "construction, alteration, and/or repair, including painting and decorating."

<sup>2</sup> OSHA's general industry standard applies to any maintenance activity that involves keeping equipment working in its existing state and is typically conducted in a routine, scheduled, and anticipated fashion; and often includes repair or refurbishment of existing structures, material, or equipment.

<sup>3</sup> In distinguishing whether to apply the construction or general industry standard, it is necessary to consider the scope and complexity of the work involved.

## Standards

The content of this SOP is based on the following OSHA standards:

- 29 CFR 1926, Subpart M, Fall Protection (OSHA Construction Standards)
- 29 CFR 1910, Subpart D, Walking-Working Surfaces (OSHA General Industry Standards)

Refer to the cited standards for detail beyond the summary provided in this SOP.

## Fall Protection Strategies

In addition to fall protection strategies described below, OSHA standards require that all walking-working surfaces on which employees are allowed to work have the strength and structural integrity to support the employee and other loads (e.g., tools, equipment, etc.). OSHA also requires that walking-working surfaces be clean, orderly, dry, and free of other hazards such as protruding objects, loose boards, corrosion, leaks, spills, ice, snow, etc.

When specifying acceptable means of fall protection, OSHA's standards distinguish between various types of spaces. Options for each are summarized in the table below and definitions for each are provided at the end of this document:

Space type (see appendix for definitions)	Guardrails	Travel restraint system	Personal fall arrest system	Designated area <sup>4</sup>	Safety net system	Covers
Unprotected sides and edges of walking-working surfaces	✓	✓	✓	✓	✓	✗
Hoist areas	✓	✓	✓	✗	✗	✗
Holes (including skylights) <sup>5</sup>	✓	✓	✓	✗	✗	✓
Runways <sup>6</sup> and ramps	✓	✗	✗	✗	✗	✗
Dangerous equipment, including protruding objects <sup>7</sup>	✓	✓	✓ <sup>8</sup>	✗	✓	✓
Openings <sup>9 10</sup>	✓	✓	✓	✗	✓	✗
Leading edges	✓	✗	✓	✗	✓	✗
Excavations	See later discussion					

<sup>4</sup> Designated areas can be established only on surfaces that have a slope from the horizontal of 10 degrees or less (or slope of 4 in 12 or less) and employees must remain in the designated area at all times. See also the discussion in this document under the heading of "Unique Requirements Under OSHA's Construction Standard."

<sup>5</sup> Covers or guardrails must be used to protect employees from tripping into or stepping into any hole that is less than 4' above a lower level.

<sup>6</sup> The guardrail may be omitted from one side of the runway if required by conditions of use provided the runway is at least 18" wide and a personal fall arrest or travel restraints system is used.

<sup>7</sup> Employees less than 4' above dangerous equipment must be protected from falling into or onto dangerous equipment by a guardrail system or travel restraint system unless the equipment is covered or guarded to eliminate the hazard.

<sup>8</sup> These devices are acceptable only when the fall distance is four feet or greater.

<sup>9</sup> Stairway openings must be protected by guardrails on three sides.

<sup>10</sup> Openings (including those with chutes attached) subject to the rules are those where the inside bottom edge of the opening is less than 39" above the walking-working surface and the outside bottom edge is 4' or more above the lower level.

## **Low-Sloped Roofs**

### **A. Activities on Low-Sloped Roofs that fall under OSHA's General Industry Standard**

- Temporary and infrequent activities may be conducted no closer than 15' from an unprotected edge of a roof without traditional fall protection devices (guardrails, safety net systems, travel restraint systems, personal fall arrest system). However, employees must be advised that they are to refrain from breaching the 15' limit and understand that they are prohibited from breaching the limits of the designated area.
- Temporary and infrequent activities may be conducted at a distance of at least 6' and not more than 15' from an unprotected edge of a roof without traditional fall protection devices (guardrails, safety net systems, travel restraint systems, personal fall arrest systems). However, a designated area must be established (see definitions).
- When work is performed at a distance of 6' or less from an unprotected edge of a roof, the employee must be protected from falling by a guardrail system, safety net system, travel restraint system, or personal fall arrest system.

### **B. Construction Activities on Low-Sloped Roofs**

Unlike OSHA's General Industry Standard, OSHA's Construction Standard does not contain provisions for a "Designated Area." Rather, OSHA's Construction Standard refers to the following similar options, each of which applies only to specific situations:

- Warning Line System
- Controlled Access Zone
- Safety Monitoring System
- Fall Protection Plan

Use of a "Controlled Access Zone" approach is limited to overhand bricklaying tasks. Use of a "Warning Line System" is limited to roofing work on low-sloped roofs and must be used in combination with a "Safety Monitoring System." Use of a "Safety Monitoring System" alone is limited to low-sloped roofs with a width of 50' or less. Under both the Controlled Access Zone and Warning Line System strategies, a physical line meeting certain design criteria (height, construction, flagging, etc.) is established to delineate the zone of exclusion (controlled access zone) or working area (warning line).

Fall Protection Plans can be developed and used in lieu of guardrails or personal fall arrest systems in very limited situations. The Fall Protection Plan option is available only for employees engaged in leading edge work, precast concrete erection work, or residential construction work; and only when the employer can demonstrate that it is infeasible or more dangerous to use guardrails, safety nets, or personal fall arrest systems. A fall protection plan will generally incorporate one or more of the following protection measures: positioning device systems, warning line systems, controlled access zones, or safety monitoring systems. Fall protection plans are subject to

heavy scrutiny, must be site and job specific, are limited in application, must be prepared in writing by a qualified individual (see definitions) and maintained at the site, among other requirements.

### **Roof Inspections**

Fall protection requirements generally do not apply when employees are making an inspection, investigation or assessment of workplace conditions prior to the actual start of work or after all work has been completed. However, the fall protection requirements do apply if the inspection/investigation/assessment is conducted during work activities or if the inspection/investigation/assessment involves significant risk of fall (e.g., leaning over an edge, etc.). In addition, if fall protection is available, it should be used regardless.

### **Excavations, Wells, Pits, Shafts, and Similar Structures**

Employees must be protected from falls into excavations, wells, pits, shafts, and similar structures with guardrail systems, fences, barricades, or covers.

### **Protection from Falling Objects**

Employees must be protected from falling objects that may originate from elevated work surfaces. Three options are specified, all of which must be supplemented with head protection/hard hats (See EHS SOP, ***Personal Protective Equipment – Head Protection***).

- Erect toeboards, screens, or guardrail systems<sup>11</sup> that prevent objects from falling from higher levels (and which meet specified design criteria);
- Erect a canopy structure that meets specified design criteria, and keep potential falling objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced.
- Barricade the area to which objects could fall, prohibit people from entering the barricaded area, and keep objects far enough from the edge so those objects do not go over the edge.

### **Training Requirements**

Supervisors of employees potentially exposed to fall hazards described in this SOP must ensure that those employees are appropriately trained/instructed as summarized below:

- Nature of fall hazards in the work area and how to recognize them.
- Procedures to be followed to minimize fall hazards.
- Correct procedures for erecting, maintaining, operating, disassembling, and inspecting the fall protection systems to be used.
- Use, operation, and limitations of personal fall protection systems including proper hook-up, anchoring and tie-off techniques, methods of use, and proper

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<sup>11</sup> Where tools, equipment, or materials are piled higher than the top edge of a toe-board, paneling or screening must be erected from the walking/working surface or toe-board to the top of a guardrail system's top rail or mid-rail, for a distance sufficient to protect persons below. Guardrail systems, when used as falling object protection, must have all openings small enough to prevent passage of potential falling objects.

methods of equipment inspection and storage as recommended by the manufacturer. See also EHS SOP, ***Personal Fall Arrest Systems***.

- Means and methods of rescue when a personal fall arrest system is used.

Training must be provided before an employee is assigned a task that puts them at risk of a fall and when:

- Changes in the workplace render previous training invalid or incomplete.
- Changes in the types of fall protection systems or equipment to be used render previous training invalid or incomplete.
- The employee has not retained the requisite understanding or skill necessary to properly use or care for fall protection equipment or observe prescribed procedures or techniques.

## Definitions

**Controlled access zone** means an area in which certain work (e.g., overhand bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.

**Designated area** means a distinct portion of a walking-working surface delineated by a warning line in which employees may perform work without additional fall protection.

- *Physical lines used to delineate the designated area generally consist of rope, wire, tape, or chain that has a minimum breaking strength of 200 pounds; is clearly visible from a distance of 25 feet away from anywhere within the designated area; erected a minimum 6' from the unprotected side(s) or edge(s) at a height of 34 – 39 inches from the walking-working surface; and meet certain other design criteria.*

**Dockboard (bridge plate)** means a portable or fixed device that spans a gap or compensates for a difference in elevation between a loading platform and a transport vehicle. Dockboards include, but are not limited to, bridge plates, dock plates, and dock levelers.

**Fall hazard** means any condition on a walking-working surface that exposes an employee to injury from a fall on the same level or to a lower level.

**Fall protection** means any equipment, device, or system that prevents an employee from experiencing a fall from elevation or that mitigates the effect of such a fall.

**Guardrail system** means a barrier erected to prevent employees from falling to lower levels.

- *Guardrail systems must be 39 – 45" in height and meet certain other design criteria for mid-rails, intermediate members, and other structural members and designed such that they are able to withstand the stated amount of force, and meet other criteria.*

**Hoist area** means any elevated access opening to a walking-working surface where hoisted equipment or materials are loaded or received.

- *If guardrail systems, chains, gates, or portions thereof are removed to facilitate the hoisting operations (e.g., during landing of materials), and an employee must lean through the access opening or out over the edge of the access opening, that employee must be protected from fall hazards by a personal fall arrest system. In addition, a grab handle must be provided on each side of the opening.*

**Hole** means a gap or void 2" or more in its least dimension in a floor, roof, or other walking-working surface.

**Leading edge** means the edge of a floor, roof, or formwork for a floor or other walking-working surface (such as a deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

**Lower level** means a surface or area to which an employee could fall. Such surfaces or areas include, but are not limited to, ground levels, floors, roofs, ramps, runways, excavations, pits, tanks, materials, water, equipment, and similar surfaces and structures, or portions thereof.

**Low-slope roof** means a roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

**Opening** means a gap or void 30" or more high and 18" or more wide in any wall or partition through which employees can fall to a lower level.

**Personal fall arrest system** means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connector, and a body harness and may include a lanyard, deceleration device, lifeline, or suitable combination of these.

- *All components must meet certain design criteria.*

**Platform** means a walking-working surface elevated above the surrounding area.

**Positioning system** means a system of equipment and connectors that, when used with a body harness or body belt, allows an employee to be supported on an elevated vertical surface, such as a wall or window sill, and work with both hands free. Positioning systems also are called "positioning system devices" and "work-positioning equipment."

**Qualified person** means one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field (fall protection and rescue) who is capable of design, analysis, evaluation and specifications in the subject work, project, or product (fall protection and rescue); and who has requisite authority.

- *Qualified persons often possess an engineering degree, which allows them to design systems and conduct structural analysis, calculation of impact forces and clearances, testing, anchorage certification, methods of control, equipment selection, etc.*

**Ramp** means an inclined surface between different elevations that is used for the passage of employees, vehicles, or both.

**Runway** means a passageway for persons, elevated above the surrounding floor or ground level, such as a catwalk, a foot walk along shafting, or a walkway between buildings.

**Safety-monitoring system** means a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

- *OSHA defines a "competent person" as: a person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as in their application and use with related equipment; and who has requisite authority to take prompt measures to eliminate hazards at the work site. The person designed the role of safety monitor must be on the same level as the worker(s) conducting the work and maintain clear communication and visual contact with workers outside of the warning line (or within the danger*

zone). *The monitor can be assigned other job duties, so long as the duties do not interfere with their role as a safety monitor.*

**Travel restraint system** means a combination of an anchorage, anchorage connector, lanyard (or other means of connection), and body support intended to be used by an employee to limit travel to prevent exposure to a fall hazard. A travel restraint system is used such that it does not support any portion of the employee's weight; otherwise the system would be a positioning system or a personal fall arrest system.

- *The system must meet certain design requirements.*
- *Travel restraint systems are not specifically mentioned in OSHA's Construction Standards, but are recognized as acceptable per Letter of Interpretation dated November 2, 1995 to Mike Amen.*

**Unprotected sides and edges** means any side or edge of a walking-working surface (except at entrances to points of access) where there is no wall or guardrail system at least 39" high.

**Walking-working surface** means any surface, horizontal or vertical, on or through which an employee walks, works, or gains access to a workplace location.

**Warning line system** means a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without the use of guardrail, body belt, or safety net systems to protect employees in the area.

- *When used, warning lines must be installed around all sides of the roof work area, and not less than 6' from the roof edge. Warning lines may consist of ropes, wires, or chains and supporting stanchions that meet certain design criteria, and having high visibility flagging installed at no more than 6' intervals. Warning lines should be installed at a height of 34 – 39 inches and resistant to tipping over. The design criteria for a warning line to delineate a designated area under OSHA's General Industry Standards is different than the design criteria for a warning line system under OSHA's Construction Standards.*