



# Commonwealth of Massachusetts Executive Office of Labor and Workforce Development Department of Labor Standards

Executive Order #511

## **Fall from Height**

### Summary of Standards and Recommendations

*This summary of standards was prepared by the Massachusetts Department of Labor Standards (“DLS”) for informational purposes and does not constitute an official interpretation by OSHA or any other agencies/entities listed as a source of standards or guidance in this document, nor an exhaustive recitation of the requirements therein. Rather, the summary is provided for the health and safety committees to assess current health and safety management of this hazard against the nationally-recognized standard. As the information provided in this document is only a summary, please consult the full standard(s) as well as any other needed sources of technical assistance for developing or improving your fall protection program.*

*It is important to note that state workers are not covered by OSHA standards; the information generated by the health and safety committees will serve to guide the Massachusetts Employee Safety and Health Advisory Committee in identifying effective and practical strategies and policies for improving the health and safety of state workers.*

#### Primary Technical Standard or Guideline:

OSHA 1910 CFR Subpart D, Walking-Working Surfaces\* (standards for fall protection in General Industry)

OSHA 1926 CFR Subpart M, Fall Protection\* (standards for fall protection in Construction)

OSHA standards were developed around two high hazard places of employment, construction sites and industrial plants (e.g., factories). This led to two different sets of OSHA standards, those for Construction and those for General Industry. For work that does not fit cleanly into either of these categories, this can create confusion as to which standard to follow. **The best course of action when unsure which standard (General Industry vs. Construction) to follow and in general is to always follow the most protective standard. The “answers” provided in the sections below follow this rule.** For your information, a breakdown of key differences between these standards for fall protection, and which applies, is provided below.

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Few activities conducted by state employees will fall under the construction standard. “Construction work” is defined by OSHA as “construction, alteration, and/or repair including painting and decorating.” Routine maintenance work, generally considered as keeping structures and equipment in their existing state, e.g., not creating a significant improvement, falls under the general industry standard. The exception to the maintenance rule is interior or exterior painting, which falls under the Construction standard.

One major difference between the OSHA general industry and construction standards for fall protection is the height at which protections kick in when there is a potential fall from an open sided floor or platform that is elevated above an adjacent surface. This height is 4 feet in the General Industry standard (requiring guardrails) and 6 feet in the Construction standard (requiring guardrails, safety nets, or personal fall arrest system). In addition, specifications for fall protection systems such as personal fall arrest systems and safety nets appear only in the Construction standard (1926.502).

Note: although OSHA 1910 Subpart D also covers slips, trips, and fall, this document focuses on fall from height as this is what health and safety committees were asked to look at.

*\* This is the primary national or state standard/guideline for this hazard. Your agency may be following an internal standard of practice or a standard from another source for this hazard. For the gap analysis, if you are following a standard other than the primary worker protection standard listed above, please indicate which standard, if any, is being followed by your agency. If this is an internal standard of practice, please report the basis upon which the determination was made to adopt the standard.*

Other Relevant Standards:

OSHA 29 CFR 1910, Subpart F, Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms

Policy:

It is recommended that the agency have a general policy to follow the OSHA standards for protection of employees from falls.

Training and Certification/Licensing Requirements:

For employees who may be exposed to fall hazards, they must be fully trained to: recognize fall hazards, know when fall protection equipment and/or procedures are needed, and in how to use any required fall protection equipment and/or procedures.

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The OSHA Construction standard for falls has additional specific training requirements.

Highlights include:

- The nature of fall hazards in the employee's work area.
- Correct procedures for assembly, maintenance, disassembly and inspection of fall protection systems.
- The use and operation of guardrail systems, personal fall arrest systems, safety net systems, safety monitoring systems, and other fall protections.

Controls – General Considerations and Administrative Controls

At what elevations are fall protection controls required?

For a potential fall from:

- *Open sided floor or platform* – 4 feet for General Industry standard, 6 feet for Construction standard, (recommended to follow the more protective 4 foot rule)
- *Scaffolding* – 10 feet
- *Steel Erection* – 15 feet
- *Into dangerous machinery, dangerous liquids, or holes* - there is no minimum elevation, protection always required

When employees must move between two different elevations:

- For a break in elevation of 19” or greater, employees cannot be required to make this move unaided. A step, stairway, ladder, or ramp meeting the requirements outlined in the OSHA standards must be provided.

*Other General Requirements to Minimize Fall Risk*

Good housekeeping (clean, orderly workplace).

Keep aisles and passageways clear.

Walking/working surfaces must have the strength and structural integrity to support employees, or employees cannot be allowed to work on the surface.

No weight overloading of floors, roofs etc. with materials and/or employees. Rated capacities must be posted.

Fall Protection Engineering and Equipment Controls – Requirements:

The table below provides an overview of what type of fall protection is required for various fall risk situations included in the OSHA standards. Below the table is an

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overview of specifications for the different fall protection equipment/controls listed in the table. Below that, items with a detailed set of use and/or equipment specifications such as scaffolding, stairways, and ladders are covered individually.

*Note that the information provided here is for the health and safety committees to assess how current fall protection measures and controls at your agency compare against the OSHA standards. For developing a fall protection program or for purchase of fall protection equipment, consult the full OSHA standard to ensure that you have all of the necessary details.*

<b>Fall Risk</b>	<b>Required Equipment/Control</b>
An <b>open-sided floor/platform/surface</b> 4 feet or more above an adjacent surface (required at 6 feet in construction standard, use of 4 foot rule recommended).	Guardrail system. For construction activities, a personal fall arrest system or safety net may be used in lieu of Guardrail system.
A <b>floor opening or hole</b> regardless of height of drop.	Guardrail system. A floor covering of sufficient strength, secured, and marked with "hole" may be used in lieu of Guardrail system. If the covering will be removed temporarily, an attendant may be used in lieu of Guardrail system.
A <b>wall opening</b> with a drop of more than 4 feet.	Guardrail system. Picket fencing, half door, or equivalent barriers may also be used. For windows, standard slats or grillwork may also be used. Barriers must be able to withstand 200 pounds of downward and outward pressure.
Working <b>above dangerous machinery or dangerous liquids</b> regardless of height of drop.	Guardrail system.
<b>Ramps, runways, other walkways</b> with a fall potential of 6' or greater.	Guardrail system.
<b>Open pits, tanks, vats, ditches.</b>	Cover or Guardrail system.
Working on <b>scaffolding</b> at 10' or higher.	Guardrail system. <i>Highlights of additional requirements for components, set-up, and use of scaffolding are provided in the sections below this table.</i>
<b>Ladders.</b>	Protection from falls on ladders is primarily achieved through proper ladder use. This is detailed in the sections below this table.

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At the <b>edge of excavations</b> of 6' or greater where the edge is not clearly visible due to plant growth or other visual barrier.	Guardrails, fences, or barricades.
At the <b>edge of a well, pit, shaft</b> or similar excavation 6' or greater.	Guardrails, fences, barricades, or covers.
Crossing over a <b>trench</b> .	Walkways are required. If trench is 6' or deeper, guardrails are required on the walkway.
A <b>leading edge</b> (such as a roof under construction) 6' or more above lower level	Guardrail, safety net system, or personal fall arrest system.
A <b>flat or low-slope roof</b> (slope of equal to or less than 4 in 12 vertical to horizontal).	Guardrails, safety net system, personal fall arrest system. Any of these can be used alone or in combination with a warning line system. For roofers, a warning line system in combination with an employee acting as a safety monitor may be used instead of guardrails, safety nets, or personal fall arrest system.
A <b>sloped roof</b> (slope greater than 4 in 12 vertical to horizontal).	Guardrail system with toeboard, safety net system, or personal fall arrest system.
Through <b>Skylights</b> .	Covers, Guardrails or Standard Skylight Screen.
A <b>powered platform</b> with a flat work surface that only moves straight up and down (such as a scissor lift).	Guardrail system.
An <b>aerial lift</b> with an "articulating" (telescoping) boom such as a bucket truck. "Articulating" means that it can be moved in multiple directions and to a wide variety of heights and angles.	A body harness attached to the bucket by a lanyard (personal fall arrest system). Use of a positioning device system (short line attachments from the bucket clipped to a body belt) is allowable by regulation, but is not recommended. <i>The manufacturer's safety information provided with the aerial lift equipment will outline the detailed fall protection requirements. These must be followed even if they exceed the OSHA standards.</i>
Going from a <b>truck onto a loading dock</b> .	Dockboards that are secured and also strong enough to carry the load imposed on them.

### *Specifications for Fall Protection Controls*

#### **Guardrail** Specification Highlights:

A guardrail system means a barrier erected to prevent employees from falling to lower levels.

- A guardrail system includes a smooth-surfaced top rail, an intermediate rail, and posts.
- The top rail shall have a vertical height of 42 inches plus or minus three inches above the walking/working level. Intermediate rail should be approximately halfway between top rail and floor.
- A toeboard (4 inches in vertical height from top to floor) is generally required when the platform is above dangerous equipment, and when there are any materials present that can be kicked off or fall to the lower level.
- Structural members shall be installed such that there are no openings in the guardrail system of more than 19 inches.
- Guardrails shall be capable of withstanding without failure a force of 200 pounds. Specifications for wood, pipe, and steel members that will meet this requirement are given in Appendix B to OSHA 1926, Subpart M (the Fall Protection section of the Construction Standards).

#### **Personal fall arrest system (PFAS)** Specification Highlights:

The OSHA standard defines a PFAS as a system used to arrest an employee in a fall from a working level (i.e., stop the fall before they hit the lower level). It consists of an anchorage, connectors, a body harness, and may include a lanyard, deceleration device, lifeline or a suitable combination of these.

- There are a number of requirements related to use, features, performance, and strength of PFAS components. A few highlights include:
  - A body harness is required, use of body belts is no longer acceptable as part of a fall arrest system.
  - The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.
  - **PFAS must be rigged so that the employee cannot free fall more than 6 feet or contact any lower level.** Note that the deceleration device will extend in length when a fall occurs. This extended length must be considered when planning to ensure that employees do not exceed the fall limits.
  - PFAS must bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet.
  - PFAS must limit the maximum arresting force on the employee to 1,800 pounds when using a body harness.
  - Ropes and straps used in body harnesses (strength components), lanyards, and lifelines must be made from synthetic fibers.

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- Connectors shall be drop forged, pressed or formed steel, or materials of equivalent strength, and shall be smooth to prevent damage to interfacing parts.
- Very detailed specifications for load capacity or breaking strength for all PFAS components are provided in the OSHA construction standard for falls, 1926, Subpart M.
- Body belts are not typically recommended and are only allowable for use with **positioning device systems**. Positioning devices shall be rigged such that an employee cannot fall more than 2 feet, with an anchor capable of supporting 3,000 lbs.
- The employer shall plan for and provide prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves. (A person cannot safely stay suspended in a harness for any substantial length of time, they are at risk of death within 30 minutes.)
- For workers such as **inspectors** who are going on to roofs to inspect, investigate, or assess, use of fall protection is not required before or after active construction, but must be used by inspectors during active construction.

**Safety Net Specification Highlights:**

Installation:

- Must be installed with sufficient clearance to prevent contact with surfaces or structures below.
- Maximum horizontal distance of outer edge of net to the edge of the working surface cannot be greater than 8, 10, or 13 feet if the vertical distance to the net is up to 5 feet, 5 to 10 feet, or more than 10 feet, respectively.
- As installed, must be capable of absorbing the impact force equal to a drop test of a 400 lb. bag of sand 30 ( $\pm$  2) inches in diameter dropped from 42 inches above the highest walking/working surface.
- The fall distance to the net cannot exceed 30 feet. Minimizing the fall distance by positioning the net as close as possible to the floor where workers are located is preferred.

Components:

- Safety net mesh cannot be longer than 6 inches on any side.
- Border rope for webbing shall have a minimum breaking strength of 5,000 lbs.

*Structures/Equipment Having a Fall Risk with Detailed Component and/or Use Specifications*

**Stairways:**

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- Stairways with 4 or more risers require standard stair railings on all open sides and hand rails on at least one enclosed side. Stairs wider than 88" require a mid-handrail.
- Fixed stairways shall have a minimum width of 22".
- Stair treads shall be slip resistant, and the tread edge nonslip.
- Rise height and tread width shall be uniform throughout a flight of stairs.
- Stair platforms shall be no less than the width of the stairway and a minimum of 30" deep.

**Ladders:**

Safety from ladder falls is typically achieved by their proper use, and not separate safety equipment. Ladder safety devices, including self-retracting lifelines and ladder attachments for fixed ladders, are required in limited circumstances. Requirements for safe use of all ladders are highlighted below. Detailed specifications and requirements for individual ladder types are given in OSHA 1926.1053 for construction applications and 1910.25, .26, and .27 for industrial applications:

- Always face the ladder when climbing, working, and descending.
- A ladder should be positioned at a pitch of 4:1, vertical to horizontal.
- A portable straight ladder must extend at least 3' above the level the worker must step onto from the ladder.
- Use ladders only for their designed purpose.
- Do not overload a ladder beyond its maximum weight load capacity (consider the weight of both person and tools) or the manufacturer's rated capacity.
- Use ladders only on stable and level surfaces, unless secured to prevent accidental movement.
- Do not move, shift, or extend ladders while in use.
- Always maintain three points of contact with hands and feet when climbing and descending the ladder.
- Do not carry loads or objects that could cause loss of balance and falling.
- Keep areas clear around the top and bottom of ladders.
- Maintain ladders free of oil, grease, and other slipping hazards.
- Secure ladders placed in areas such as passageways, doorways, or driveways or where they can be displaced by workplace activities or traffic to prevent accidental movement. Or, use a barricade to keep traffic or activity away from the ladder.
- Do not use ladders on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental movement. Do not use slip-resistant feet as a substitute for exercising care when placing, lashing, or holding a ladder on slippery surfaces.
- Step Ladders: do not stand on the top or top step of the ladder; only use when fully opened and braced.

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**Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms**

Detailed requirements for the full range of these types of lift devices are given in OSHA 29 CFR 1910, Subpart F, Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms. Key general requirements are below:

- Use fall protection as outlined in the table above.
- NEVER ride on a device that is not designed/intended to serve as a manlift or elevated work platform. For example, do not ride in the bucket of an excavator, do not ride the forklift arms, do not ride on a Lull or any other device intended to lift materials and not people.
- Any modifications to this equipment must only be done in accordance with the manufacturer.

**Scaffolding:**

Scaffolding shall be furnished (and erected in accordance with the OSHA standards 1910.28, 1926.451, .452, and .453) for persons engaged in work that cannot be done safely from the ground, from solid construction, or from ladders that conform to OSHA 1910.25 and 1910.26.

Key elements of the general safety requirements in the OSHA standard for scaffolding are outlined below. The OSHA standard (29 CFR 1910.28) provides detailed specifications for different scaffolding types, such as wood pole scaffolds and tube and coupler scaffolds.

*General*

- The use of shore scaffolds or lean-to scaffolds is prohibited.

*Set-up and Use*

- The footing or anchorage shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement.
- The poles, legs, or uprights of scaffolds shall be plumb, and securely and rigidly braced to prevent swaying.
- Scaffolds shall be secured to permanent structures through use of anchor bolts, reveal bolts, or other equivalent means. Window cleaners' anchor bolts shall not be used.
- An access ladder or equivalent or equivalent safe access shall be provided.
- **Standard guardrails or personal fall arrest systems (PFASs) are required at scaffold heights of 10 feet or greater.**
- Where persons are required to work or pass under the scaffolds, a screen between the toeboard and guardrail is required. This screen must extend along the entire opening, and be of 18 gauge standard wire one half inch mesh or equivalent.

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- Scaffolds shall not be altered or moved horizontally while in use or occupied.
- Any scaffold damaged or weakened shall not be used until fully repaired.
- All planking or platforms shall be overlapped a minimum of 12 inches or secured from movement.
- Scaffold planks shall extend over their end supports not less than 6 inches and not more than 18 inches.
- Nails or bolts used in the construction of scaffolds shall be of adequate size and sufficient number at each connection to develop the designed strength of the scaffold. Nails shall not be subjected to a straight pull and shall be driven full length.
- Employees shall not work on scaffolds during storms or high winds.
- Employees shall not work on scaffolds which are covered with ice or snow unless all ice and snow are removed and the planking is sanded.
- Tools, materials, and debris shall not be allowed to accumulate in quantities to cause a hazard.
- Overhead protection shall be provided to employees

*Component Specifications*

- Scaffolds and their components shall be capable of supporting without failure at least four times the maximum intended load.
- Scaffolds shall not be loaded in excess of the working load for which they are intended.
- All load-carrying timbers of the scaffold framing shall be a minimum of 1,500 f (stress grade). All planking shall be scaffold grade as recognized by grading rules for the species of wood used.

Web link to full standard or guideline:

*Informational resources identified below can also be found on our website at [www.mass.gov/dols/eo511](http://www.mass.gov/dols/eo511).*

OSHA Standards:

[www.osha.gov](http://www.osha.gov), select the “Regulations” tab from the top menu bar. For 1910 standards select the “General Industry” tab. For 1926 standards, select the “Construction” tab. Then, scroll down to find the standard by number.

OSHA 1910 CFR Subpart D, Walking-Working Surfaces (standards for fall protection in General Industry)

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OSHA 1926 CFR Subpart M, Fall Protection (standards for fall protection in Construction)

OSHA 29 CFR 1910, Subpart F, Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms