

## IDENTIFICATION

TOPIC TITLE: Stairs and Ladders

MINIMUM TIME: 30 minutes

## OBJECTIVES

### Terminal Objective:

Given best practices and current OSHA and industry information regarding worksite illnesses, injuries, and/or fatalities, the student will be able to recognize how to protect himself/herself from hazards associated with stairways and ladders.

### Enabling Objectives:

1. Identify types of stairways and ladders used at a construction site.
2. Describe types of hazards (i.e., slips, trips, and falls) associated with the use of stairs and ladders.
3. Describe protective methods used to prevent stairway and ladder hazards.
4. Recognize employer requirements to protect workers from stairway and ladder hazards.

## INSTRUCTOR MATERIALS AND RESOURCES

- PowerPoint Presentation: *Stairs and Ladders*
- Knowledge Check Answer Key: *Stairs and Ladders*

## STUDENT MATERIALS

- OSHA Fact Sheet: *Reducing Falls in Construction – Safe Use of Extension Ladders*
- OSHA Fact Sheet: *Reducing Falls in Construction – Safe Use of Stepladders*
- OSHA Fact Sheet: *Reducing Falls in Construction – Safe Use of Job-made Wooden Ladders*
- Topic test for *Stairs and Ladders*

## TEACHING PROCEDURES ---Preparation, Presentation, Application, Evaluation

### **Anticipatory Set (Focus Attention/Gain Interest)**

**Estimated Time: ?? hours**

| Key Points  | Methods                                     |
|---|---|
| <p>From OSHA Construction eTool (2001):</p> <p><i>An employee was climbing a 10-foot ladder to access a landing which was 9 feet above the adjacent floor. The ladder slid down, and the employee fell to the floor, sustaining fatal injuries. Although the ladder had slip-resistant feet, it was not secured, and the railings did not extend 3 feet above the landing.</i></p> <p>Every year, about 25,000 injuries occur that are due to falls from stairways and ladders. Whenever there is a break in elevation of 19 inches or more, there must be a stairway or ladder to provide proper access to a higher or lower level, unless a ramp, runway, embankment, or some personnel hoist is provided.</p> <p>Use select OSHA Fatality Report related to ladder/stairway fatalities to emphasize hazards and need for safe use.</p> | <p>Case Study</p> <p>PPT slides #1 – #4</p> |

### **Presentation (Instruction)**

**Estimated Time: ?? hours**

| Key Points  | Methods                   |
|---|---------------------------|
| <p>I. Types of ladders and stairways in construction</p> <p>A. Ladders</p> <ol style="list-style-type: none"><li>1. Portable – a ladder that can be readily moved or carried.<ol style="list-style-type: none"><li>a. Self-supporting (Ex. Stepladder or other foldout types)</li><li>b. Non-self-supporting (Ex. Extension ladder or other leaning types)</li></ol></li><li>2. Fixed – a ladder that cannot be readily moved or carried because it is an integral part of a building or structure.</li><li>3. Job-made wooden ladder</li></ol> <p>B. Stairways</p> <ol style="list-style-type: none"><li>1. Temporary stairways</li><li>2. Permanent</li></ol> | <p>PPT slides #5 – #7</p> |

## II. Types of hazards

PPT slides #8 – #9

### A. Slips

1. Grease, oil, wet paint, water, or other slippery contaminants on floor; spills/debris
2. Slippery coatings on ladder

### B. Trips

1. Poor housekeeping/clutter, loose cords, improper use of floor hole protection covers,
2. Power cords, construction materials, or other items in work area that create tripping hazard
3. Indoor walking surface irregularities
4. Outdoor walking surface irregularities
5. Inadequate lighting
6. Loose wires

### C. Falls – conditions leading to injury-causing incidents involving falls from ladders or stairways

1. Improper set-up
2. Using ladders with structural defects
3. Portable ladders not extending 3 feet above landing surface
4. Not securing ladder correctly
5. Standing on top two steps of a stepladder
6. Overreaching when working from a ladder
7. Inadequate or missing guardrails or handrails on stairways

### D. Other potential hazards

1. Ladder contact with power lines
2. Falling objects from elevated level when objects are placed on ladders or stairways or are being carried up/down the ladder or stairway
3. Protruding objects, sharp edges, or rough spots on stairways that could cause injuries

PPT slides #10 – #26

## III. Reducing or eliminating hazards

### A. Ladders

1. Ladder-use practices related to OSHA's general requirements:
  - a. Extend side rails of portable ladders 3 feet above the upper landing surface.

- i. When extension is not possible, secure ladder and provide a grasping device to assist workers in mounting/dismounting ladder.
  - ii. A ladder extension must not deflect under a load that would cause the ladder to slip off its support.
  - iii. Keep ladders free of oil, grease, and other slippery substances.
- b. Do not exceed maximum intended load of a ladder or the manufacturer's rated capacity.
- c. Use ladders only for the purpose for which they were designed.
- d. Angle non-self-supporting ladders so that the horizontal distance from the top support to the foot of the ladder is  $\frac{1}{4}$  the working length of the ladder.
- e. Pitch fixed ladders no more than 90 degrees from the horizontal, measured from the back side of the ladder, when used.
- f. Use ladders only on stable and level surfaces or secure ladders to prevent movement.
- g. Do not use ladders on slippery surfaces, unless they are secured or have slip-resistant feet to prevent movement. Slip-resistant feet must not be used as a substitute for the care in placing, lashing, or holding a ladder upon a slippery surface.
- h. When using a ladder in a doorway, passageway, driveway, or other area where it can be displaced by workplace activities or traffic, secure the ladder to prevent movement or a barricade to keep traffic/activities away from the ladder.
- i. Keep clear areas around top and bottom of ladders.
- j. Equally support the two rails of a non-self-supporting ladder at the top, unless it is equipped with a single support attachment.
- k. Do not move, shift, or extend ladder while in use.
- l. When the worker or ladder could make contact with exposed energized electrical equipment, only use a ladder with nonconductive siderails.
- m. Maintain 3-point contact when ascending or descending a ladder.

- n. Face the ladder when going up or down.
  - o. Do not carry any object or load on a ladder that could cause a loss of balance and fall.
  - p. Do not use the top or top step of a stepladder.
  
  - q. Do not use the cross-bracing on the rear section of a stepladder for climbing.
  - r. Inspect ladders (competent person) for visible defects periodically and after any incident that could affect their safe use.
  - s. Do not use single-rail ladders.
2. Ladder requirements, per OSHA:
- a. A double-cleated ladder or two or more ladders must be provided when ladders are the only way to enter or exit a work area having 25 or more employees, or when a ladder serves simultaneous two-way traffic.
  - b. Rungs, cleats, and steps:
    - i. Must be parallel, level, and uniformly spaced when the ladder is ready for use;
    - ii. Must be spaced 10 – 14 inches apart, along portable or fixed ladder side rails;
    - iii. Must be 8 – 12 inches apart, between center lines of the rungs, cleats, and steps of step stools;
    - iv. Must be 8 – 18 inches apart between center lines of rungs, cleats, and steps of extension trestle ladders; the rung spacing on the extension section must be 6 – 12 inches.
  - c. Do not tie or fasten together ladders to create longer sections, unless design is specific for that use.
  - d. The resulting side rail of spliced side rails must have strength equal to a one-piece side rail of same material.
  - e. Stepladder must have a metal spreader or locking device to hold ladder in open position during use
  - f. Platforms or landings must be used to offset two or more separate ladders used to reach an elevated work area.
  - g. The surface of ladder components must be free of projections, sharp edges, or abrasive materials

- that could puncture or cut user, or snag clothing.
  - h. Wood ladders must not be coated with any opaque covering, except for identification or warning labels which may be placed only on one face of a side rail.
3. Structural defects
- a. Remove from service any ladder with structural defect
    - i. Broken or missing rungs, cleats, or steps
    - ii. Broken or split rails
    - iii. Corroded parts
    - iv. Other faulty or defective components
  - b. Mark as defective or tag "Do Not Use"
  - c. Repair ladder to condition meeting its original design criteria before being returned to use
- B. Reducing or eliminating hazards with stairs
- 1. Install at least one handrail on stairways with four or more risers or more than 30 inches of rise
  - 2. Install a stair-rail system, including a top rail, mid-rail, and sometimes a toeboard, along the unprotected sides and edges of stairways that rise six feet or more
    - a. Must be between 30-36 inches from the upper surface of the stair rail system to the surface of the tread
    - b. Must be able to withstand a force of at least 200 pounds
  - 3. Build/maintain stairs that meet OSHA requirements
    - a. Uniform riser height and uniform tread depth with less than 1/4 inch variation
    - b. Built and installed at an angle between 30 – 50 degrees on the diagonal
    - c. Install landings (minimum 30 inches deep and 22 inches wide) at least every 12 feet of vertical rise; protect sides with standard 42" guardrail system
    - d. Remove dangerous projections, such as protruding nails, from all stairway/rail parts
    - e. Correct slippery conditions on stairways with slip-resistant material
  - 4. Fill temporary pan stairs to the top edge of each pan, and replace treads and landings when worn below the top edge.

|   |   |
|---|---|
| <p>IV. Employer Requirements</p> <p>A. Comply with OSHA standards related to stairs and ladders, including:</p> <ol style="list-style-type: none"> <li>1. Training requirements</li> <li>2. Inspection requirements</li> </ol> <p>B. Comply with manufacturers' requirements and recommendations for all ladders.</p> | <p>PPT slide #27</p>                          |
| <p><b><u>Application (How students apply what they learn)</u></b></p>   | <p><b><u>Estimated Time: ?? hours</u></b></p> |
| <p>Key Points</p>   | <p>Methods</p>                                |
| <p>Show pictures of ladders and stair use and condition. Have students identify any unsafe actions or conditions and discuss related best practices.</p> <p>Have students demonstrate the proper way to set up, ascend, and descend a ladder.</p>   | <p>PPT slides #28 – #29</p>                   |
| <p><b><u>Evaluation/Summary</u></b></p>   | <p><b><u>Estimated Time: ?? hours</u></b></p> |
| <p>Key Points</p>   | <p>Methods</p>                                |
| <p>Knowledge Check: <i>Stairs and Ladders</i></p>   | <p>PPT slides #30 – #36</p>                   |

## **References**

### **OSHA Standard:**

[https://www.osha.gov/pls/oshaweb/owasrch.search\\_form?p\\_doc\\_type=STANDARDS&p\\_toc\\_level=1&p\\_keyvalue=Construction](https://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=Construction)

- 1926 Subpart X – Ladders

1926.1050 – Scope, application, and definitions applicable to this subpart.

1926.1051 – General requirements.

1926.1052 – Stairways.

1926.1053 – Ladders.

1926.1060 – Training requirements.

1926 Subpart X App A – Ladders

### **OSHA Publications**

<https://www.osha.gov/pls/publications/publication.AthruZ?pType=Industry>

- *Ladder Safety: Reducing Falls in Construction – Safe Use of Extension Ladders*, Fact Sheet (OSHA FS-3660 – 2013) (English: [PDF](#))
- *Ladder Safety: Reducing Falls in Construction – Safe Use of Job-made Wooden Ladders*, Fact Sheet (OSHA FS-3661 – 2013) (English: [PDF](#))
- *Ladder Safety: Reducing Falls in Construction – Safe Use of Stepladders*, Fact Sheet (OSHA FS-3662 – 2013) (English: [PDF](#))
- *Ladder Safety QuickCard™* (OSHA 3246) (English: [HTML](#) [PDF](#))
- *Ladder Safety: Falling Off Ladders Can Kill – Use Them Safely* (OSHA 3625 – 2013) (English: [EPUB](#) [MOBI](#) [PDF](#)) (OSHA 3625 – 2013) (Spanish: [EPUB](#) [MOBI](#) [PDF](#))
- *Stairways and Ladders* (OSHA 3124 – 2003) (English: [HTML](#) [PDF](#))



## OSHA References/Resources

- *Falls: Misuse of Portable Ladders* (2001), OSHA Construction eTool, <https://www.osha.gov/SLTC/etools/construction/falls/ladders.html>