

LADDERS AND CLIMBING

1.0 INTRODUCTION

Certain field activities, such as stack sampling and onsite remediation (e.g., excavations, access to storage tanks), may require personnel to use ladders.

Ladders are appliances usually consisting of two side rails joined at regular intervals by cross-pieces called steps, rungs, or cleats, on which a person steps in ascending or descending. This module covers the activities related to ladders and climbing and provides basic safety instructions to protect workers from the hazards associated with ladders and climbing.

Construction of all ladders should conform to the provisions of the applicable state, provincial, or local codes, whichever are more restrictive. Special-use climbing equipment, such as a combination stepladder-work platform, should comply with the applicable codes.

(For detailed information on ladders, see ANSI A14.1, *Safety Requirements for Portable Wood Ladders*; ANSI A14.2, *Safety Requirements for Portable Metal Ladders*; ANSI A14.3, *Safety Requirements for Fixed Ladders*; ANSI A14.4, *Safety Requirements for Job-Made Ladders*; and ANSI A14.5, *Safety Requirements for Portable Reinforced Plastic Ladders*.)

Learning Objective(s)

At the end of this module you will be able to:

- Identify the types of portable and fixed ladders
- Provide information on the potential hazards associated with ladders and climbing
- Describe safety precautions for use with ladders and when climbing
- Provide information on the inspection and maintenance of portable and fixed ladders.

2.0 PORTABLE LADDERS

Portable ladders may be used by maintenance personnel or by EPA personnel in the field during sampling or inspection activities. Injuries can result from damaged, improperly positioned or incorrectly constructed ladders. The following sections describe safety precautions and procedures for safe portable ladder use.

2.1 Types

Portable ladders can be made of wood, metal, or fiberglass. There are several types of portable ladders:

- Step ladder

- Single ladder
- Extension ladder.

2.2 Inspection

Ladders shall be inspected frequently and those that have developed defects shall be removed from service. The following should be observed during inspection of portable ladders:

- Wooden ladders should be inspected for damage such as bows, bends, cracks, loose joints, contamination, inoperable footings, and splintered or rotted wood
- Metal ladders should be inspected for sharp edges, burrs, dents, bends, poor rung-to-side rail connections, inoperable footings, and sheared rivets.

2.3 Use/Placement

The following recommendations should be followed for use/placement of portable ladders:

- Portable rung and cleat ladders shall, where possible, be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is one-quarter of the working length of the ladder
- Metal ladders should not be used near energized electrical circuits or installations
- Ladders for which dimensions are specified should not be used by more than one person at a time nor with ladder jacks and scaffold planks where use by more than one person is anticipated
- Portable ladders should either be placed so that the side rails have a secure footing or be lashed or held in position
- Ladders shall not be placed in front of doors opening toward the ladder unless the door is blocked, locked, or guarded
- Ladders shall not be placed on boxes, barrels, or other unstable bases to obtain additional height
- Ladders with broken or missing steps, rungs, or cleats, broken side rails, or other faulty equipment shall not be used
- Short ladders shall not be spliced together to provide a longer section
- Ladders made by fastening cleats across a single rail shall not be used
- Ladders shall not be used as guys, braces, or skids, or for other than their intended purposes
- Never stand on the top two rungs or steps of a ladder
- Extension ladders, when in the extended position, must have sufficient overlap to transmit all forces safely from one section to the next

Two Section Ladder Size

- Up to and including 36 feet
- Over 36 and up to and including 48 feet
- Over 48 feet and up to and including 60 feet

Required Overlap

- 3 feet
- 4 feet
- 5 feet

Three Section Ladders

- Double the figures shown for two-section ladders
- Multi-section ladders shall not exceed 60 feet
- Portable rung ladders with reinforced rails shall be used only with the metal reinforcement on the underside
- No ladder should be used to gain access to a roof unless the top of the ladder extends at least three feet above the point of support, at eave, gutter, or roofline
- Portable rung ladders should be equipped with nonslip bases when there is a hazard of slipping
- The bracing on the back legs of step ladders must not be used for climbing.

2.4 Care/Maintenance

To insure safety and serviceability, the following precautions on the care of ladders shall be observed:

- Ladders shall be maintained in good condition
- Metal bearings of locks, wheels, pulleys, etc. shall be frequently lubricated
- Frayed or badly worn rope shall be replaced
- Safety feet and other auxiliary equipment shall be kept in good condition
- Rungs shall be kept free of grease and oil
- Defective ladders shall be marked and taken out of service until necessary repairs are made.

2.5 Transporting Ladders

When transporting ladders, the following should be observed:

- Securely lash ladder to the vehicle
- If the ladder extends beyond the length of the vehicle, affix brightly colored flags to each end of the ladder.

3.0 FIXED LADDERS

Fixed ladders are ladders permanently attached to a structure, building, or equipment and are encountered at plants, work sites, on the sides of smoke stacks, storage tanks, etc. The following sections describe safety precautions and procedures for safe fixed ladder use.

3.1 Types

Fixed ladders are constructed of either wood or metal and may be equipped with cages, baskets, or other types of fall protection.

3.2 Inspection

Fixed ladders should be inspected for the condition of the following specific features:

- Rungs and cleats
- Side rails
- Fastenings
- Splices
- Electrolytic action and corrosion
- Welding
- Protection from deterioration
- Clearance.

3.3 Use

Ladders not meeting the aforementioned specifications should not be used.

3.4 Cages/Wells and Safety Devices

Cages or wells must be provided on fixed ladders of more than 20 feet to a maximum unbroken (without landing platforms) length of 30 feet. Ladder safety devices may be used in lieu of cage protection on tower, water tank and chimney ladders over 20 feet in unbroken length. A ladder safety device is any device, other than a cage or well, designed to eliminate or reduce the possibility of accidental falls and may incorporate such features as:

- Life belts
- Friction brakes
- Sliding attachments
- Landing platforms.

3.5 Care/Maintenance

As with all ladders, fixed ladders must be maintained in a safe condition. Refer to Section 2.4 for detailed care/maintenance instructions.

4.0 CLIMBING

The following safety procedures should be observed when climbing ladders:

- Always face the ladder when climbing and descending
- Place your foot on the rung so that the front edge of the heel is against the rung
- Grip the rungs, not the rails
- Use a climbing rhythm
- Both hands must be free for gripping the rungs of the ladder; don't carry objects in one hand and climb with the other

- Carry small tools or other work materials in your clothing or attached to a belt
- Do not carry large objects up or down a ladder, use hand lines
- Never have more than one person climbing the ladder at one time
- Before climbing a portable ladder, if possible, position someone at the foot of the ladder to stabilize the bottom
- Before climbing, make sure the ladder is positioned securely or tied off.

5.0 PERSONAL PROTECTIVE, SAFETY AND EMERGENCY EQUIPMENT

Examples of personal protective equipment that should be worn include:

- Well-fitting gloves with suitable gripping surface
- Sturdy boots in good repair with suitable soles
- Clothing that is not likely to catch on the ladder.

Safety and fall protection equipment such as the safety devices mentioned in Section 3.4 should be available for use.

6.0 SUMMARY

This module has presented information on the two main types of ladders: portable and fixed. The use, maintenance, inspection and applicable safety devices were discussed for each. In addition, safety procedures to be observed during climbing were described. Finally, suggestions on the types of personal protective, safety and fall protection equipment were given.

Key concepts presented in this module are:

- EPA personnel may use fixed and portable ladders.
- Ladders must be inspected frequently to ensure that their integrity remains intact.
- Ladder safety devices or cage protection must be used on fixed ladders of more than 20 feet.
- Metal ladders should not be used near energized electrical circuits or installations.
- Position ladder using the 1/4 rule; the base should be one-fourth the ladder length from the vertical plane of the top support.
- Follow safety procedures for climbing ladders.

Measures you can take to minimize the risks associated with ladders and climbing include:

- Perform a visual inspection of the ladder before use.
- Do not use ladders for other than their intended use.
- Do not use the top two rungs/steps of a ladder.
- Ensure that the ladder has a secure footing, is lashed, or held in position.

- Use cages, wells, or other safety devices with fixed ladders of more than 20 feet.
- Climb with two hands; do not carry objects in one hand and climb with the other.
- Always climb and descend facing the ladder.

EXERCISE

Answer the following as True or False.

1. ____ The two types of ladders EPA personnel may use during field activities are portable and fixed.
2. ____ If defects such as dents, bends or inoperable footings are identified during an inspection, the portable ladder can be used until a replacement is found.
3. ____ Metal portable ladders can be used in any work situation.
4. ____ Portable ladders should not be used as braces or skids.
5. ____ The tops of the ordinary types of step ladders shall not be used as steps.
6. ____ A ladder safety device is any device, including a cage or well, designed to eliminate or reduce the possibility of accidental falls.
7. ____ When climbing and descending, face the ladder.
8. ____ When climbing, place the toe of your shoe on the rung.
9. ____ More than one person may climb a ladder at one time if there is a minimum of 10 feet separating them.
10. ____ Examples of recommended personal protective equipment include gloves, boots, and clothing not likely to catch on the ladder.

EXERCISE KEY

Answer the following as True or False.

1. **T** The two types of ladders EPA personnel may use during field activities are portable and fixed.
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8. **F** When climbing, place the toe of your shoe on the rung.
9. **F** More than one person may climb a ladder at one time if there is a minimum of 10 feet separating them.
10. **T** Examples of recommended personal protective equipment include gloves, boots, and clothing not likely to catch on the ladder.