

# Portable ladder safety

**This issue of the Construction Depot focuses on ladder safety — how to select ladders and use them properly.**

Ladders are indispensable tools. We take them for granted because they're easy to use, practical, and versatile. However, in 2004, 29 percent of all disabling falls among Oregon construction workers were falls from ladders — the highest percentage of disabling fall-related injuries in the industry.

Why do people fall from ladders if they're so easy to use? Most falls happen when a ladder slips, tilts, or shifts as a worker is climbing or descending. Other reasons include a slip of the foot, loss of balance or overreaching, and being struck by a vehicle or other moving object.

You don't have to fall far to get hurt. Most workers injured in falls from ladders were working less than 10 feet above the ladder's base of support.



## Selecting portable ladders

*Which ladder is the right one for your job? You'll save time and energy and reduce your risk of injury if you know how to select the correct one. Key factors are type and style, proper length, duty rating, and the material from which the ladder is made.*

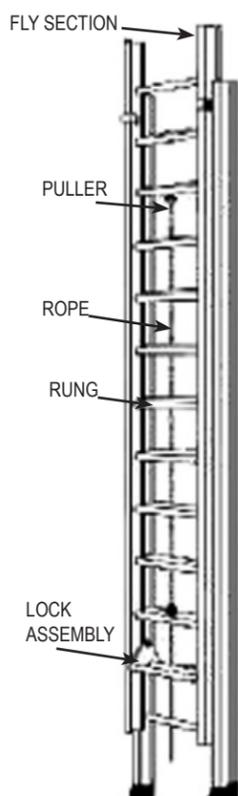
### Type and style

Portable ladders are either non-self-supporting (such as an extension ladder) or self-supporting (such as a standard stepladder). You're likely to find the right size, shape, and type of ladder to accomplish your task within one of these categories.

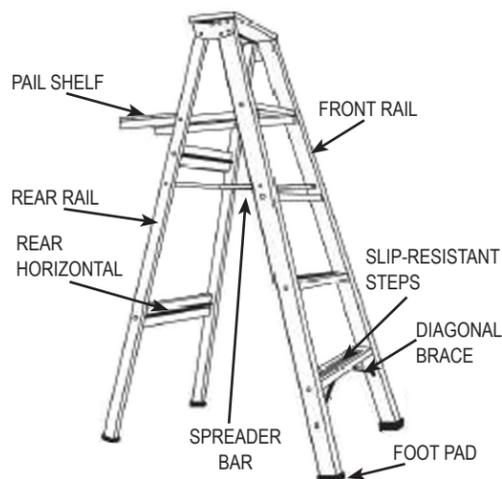
### Length

**Stepladders.** You should be able to reach about four feet above the top of the ladder when you're standing two steps down from the top. For example, you should be able to reach an 8-foot ceiling on a 4-foot ladder. Never use the top of a stepladder as a step.

**Extension ladders.** To allow for proper setup, the total length of an extension ladder should be 7-10 feet longer than the vertical distance to the upper contact point on the structure — a wall or roofline, for example. Never stand on the ladder rungs that extend above a roofline.



**Extension ladder**



**Stepladder**

### Duty rating

Manufacturers give ladders duty ratings, based on the maximum weight they can safely support. The worker's weight plus the weight of any tools and materials that are carried onto the ladder must be less than the duty rating. Before you purchase a ladder consider the maximum weight it will support. Don't subject it to a load greater than its duty rating.

#### Duty ratings for portable ladders:

- Special duty (IAA) 375 pounds
- Extra heavy duty (I-A) 300 pounds
- Heavy duty (I) 250 pounds
- Medium duty (II) 225 pounds
- Light duty (III) 200 pounds

### Material

**Most portable ladders are wood, aluminum, or fiberglass.**

**Wood.** Wood provides a natural feel and good insulation against heat and cold. However, untreated wood ages quickly; wood ladders need a protective coat of clear varnish to keep the wood from drying and splitting. Also, wood ladders are heavy, particularly longer ones.

**Aluminum.** Aluminum ladders are lightweight and corrosion resistant. Aluminum will not crack or chip with rough handling; however, aluminum doesn't insulate well against heat and conducts electricity. Never use aluminum ladders for work near energized electrical lines.

**Fiberglass.** Fiberglass is durable, weather resistant, and nonconductive when clean and dry. Unlike wood, fiberglass won't dry out or split and provides better insulation against heat than aluminum. However, fiberglass ladders are heavier than comparable aluminum or wood ladders and can chip or crack with improper handling.

#### Handling fiberglass ladders

Fiberglass ladders must be handled and maintained with greater care than wood ladders. After a few years, the reinforcing fibers in fiberglass rails may become exposed, resulting in a condition known as "fiber bloom." High humidity and exposure to strong sunlight can accelerate the condition. Fiber bloom doesn't affect a ladder's strength; however, it will affect the appearance and may cause users mild discomfort if exposed fibers penetrate their skin.

Regular washing and waxing with a commercial non-slip paste wax will protect the ladder and reduce the potential for fiber bloom. Periodically coating the ladder with acrylic lacquer or polyurethane also will protect it.

# Using ladders

## Placing the ladder

- Move the ladder near your work. Get help if the ladder is too heavy to handle alone. Lock the spreaders on a stepladder. Secure the lock assembly on extension ladders.
- Make sure there are no electrical wires overhead.
- Protect the base of the ladder if vehicles or pedestrians could strike it.
- Make sure that a non-self-supporting ladder extends at least 3 feet above the top support point for access to a roof or other work level. Do not step on rungs above the upper support.
- Angle non-self-supporting ladders properly. The length of the side rails from the ladder's base to the top support points (the working length) should be four times the distance from ladder's base to the structure (the set-back distance). Done correctly, this results in a 4:1 set-up angle.

## Placing an extension ladder

1. The ladder should be closed. Position the ladder with the base section on top of the fly section. Block the bottom of the ladder against the base of the structure.
2. Make sure there is clearance and no electrical lines are overhead. Carefully "walk" the ladder up until it is vertical. Keep your knees bent slightly and your back straight.
3. Firmly grip the ladder, keep it vertical, and carefully move back from the structure about one quarter the distance of the ladder's working length. This allows you to place it at the correct angle against the structure.
4. Raise the fly section. After the bottom rung of the fly section clears the bottom rung of the base section, place one foot on the base rung for secure footing.
5. Lean the ladder against the structure. The distance from the base of the ladder to the structure should be one quarter the distance of the ladder's working length. Make sure the ladder extends 3 feet above the top support points for access to a roof or other work level. Both rails should rest firmly and securely against the structure.

## Ascending, working, and descending

- Wear shoes that have non-slip soles; make sure they are free of mud, oil, or anything else slippery.
- Grasp the side rails with both hands; you have a better chance of avoiding a fall if a rung or step fails.
- Climb facing the ladder. Center your body between the rails and keep your hips square to the rungs.
- Hold the ladder with one hand while working with the other hand whenever possible.
- Attach light, compact tools or materials to the ladder or to yourself.
- Raise and lower heavy, awkward loads with a hand line or a hoist.
- Use extreme caution when you're pushing or pulling materials.

## Ladder inspection, maintenance, and repair

Neglected ladders quickly become unsafe ladders. Step bolts loosen, sockets and other joints work loose, and eventually the ladder becomes unstable. Periodic maintenance extends a ladder's life and saves replacement costs. Maintenance includes regular inspection, repairing damage, and tightening step bolts and other fastenings.

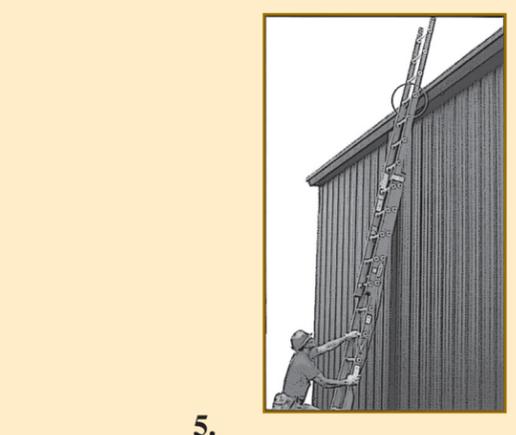
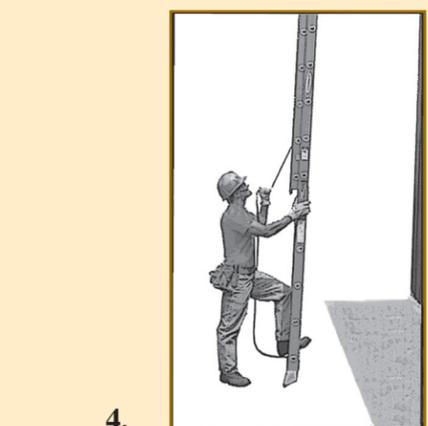
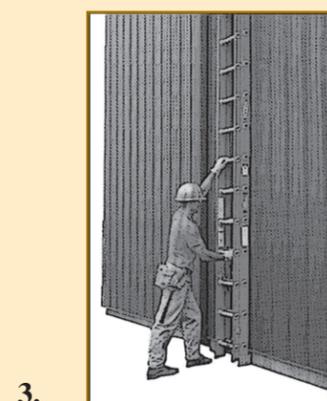
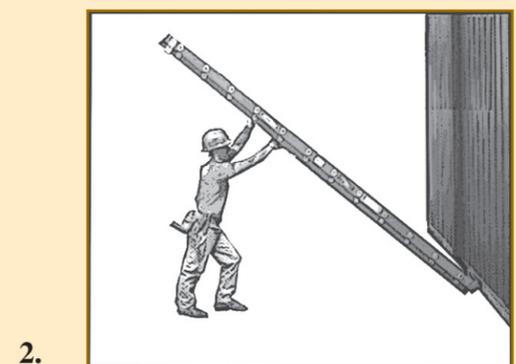
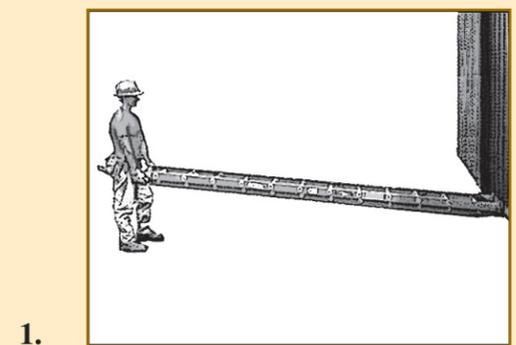
- Inspect your ladder for damage each time you use it. (A competent person must periodically inspect ladders for defects and after any occurrence that could affect their safe use.)
- Replace lower steps on wooden ladders when one-fourth of the step surface is worn away. Typically, the center of a step receives the most wear. Mineral abrasive or other skid-resistant material reduces wear.
- Don't paint wood ladders; paint conceals defects.
- Clean and lightly lubricate moving parts such as spreader bars, hinges, locks, and pulleys.
- Inspect and replace damaged or worn components and labels according to manufacturer's instructions.
- Inspect the rails of fiberglass ladders for weathering, fiber bloom, and cracks.
- Keep the ladder away from heat sources and corrosive materials.



### Achieving the 4:1 set-up angle

A non-self-supporting ladder should have a set-up angle of about 75 degrees – a 4:1 ratio of the ladder's working length to set-back distance. Here's how to achieve it:

Stand at the base of the ladder with your toes touching the rails. Extend your arms straight out in front of you. If the tips of your fingers just touch the rung nearest your shoulder level, the angle of your ladder has a 4:1 ratio.



# A checklist of safe practices for using portable ladders

- When portable ladders are used for access to an upper landing, the side rails extend at least 3 feet above the upper landing. When this is not possible, the ladder is secured to a rigid support at its top and a grab rail is available to help employees get off the ladder.
- Ladders are free of oil, grease, and other hazards that could cause slips.
- Ladders are not loaded beyond the manufacturer's duty rating.
- Ladders are used only for the purpose for which they were designed.
- Non-self-supporting ladders are placed so that the working length of the ladder is four times the horizontal distance from the ladder's base to the structure — a 4:1 ratio.
- Ladders are used on stable, level surfaces or they are secured so that they cannot be displaced.
- Ladders are not used on slippery surfaces unless they are secured or they have slip-resistant feet.
- All ladders, except stepladders, have non-slip safety feet.
- Employees are prohibited from placing ladders on boxes, barrels, and other unstable objects.
- Ladders used near passageways, doorways, or driveways are protected so that vehicles or pedestrians do not strike them.
- The area around the top and bottom of a ladder is free from slipping and tripping hazards.
- The top of a non-self-supporting ladder is placed so that both rails are supported equally.
- Ladders are not moved, shifted, or extended when they are occupied.
- Ladders that could contact exposed energized electrical equipment have nonconductive side rails.
- Portable metal ladders have legible signs reading "CAUTION: Do Not Use Around Electrical Equipment" or equivalent wording.
- The top step of a stepladder is not used as a step.
- Cross bracing on the rear section of a stepladder is not used for climbing unless the ladder is designed for that purpose.
- Employees are prohibited from using ladders that are missing steps, rungs, cleats, or have broken side rails, or other faulty parts.
- A competent person inspects ladders periodically for defects and after any occurrence that could damage them.
- Defective ladders are marked as defective, or are tagged "Do Not Use," and removed from service until they are repaired.
- Repaired ladders meet their original design criteria before they are returned to service.
- Employees face ladders while climbing or descending.
- Employees use at least one hand to grasp the ladder when they are climbing and descending.
- Employees do not carry objects or loads that could cause them to lose their balance.
- Employees who use ladders receive training by a competent person in proper use, placement, and handling.
- Employees know the hazards associated with ladder use and follow procedures that minimize the hazards.
- Retraining is provided periodically to ensure that employees maintain their knowledge of proper ladder use, placement, and handling.

## Storing ladders

*Prolong a ladder's life by storing it properly:*

- Use a well-ventilated storage area.
- Store wood and fiberglass away from excessive moisture, heat, and sunlight. Keep them away from stoves, steam pipes, or radiators.
- Store non-self-supporting ladders in flat racks or on wall brackets that will prevent them from sagging. Store stepladders vertically, in a closed position, to reduce the risk of sagging or twisting. Secure them so that they won't tip over if they are struck.
- Keep material off ladders while they are stored.

## Transporting ladders

When you hand-carry a ladder, keep the front end elevated, especially around blind corners, in aisles, and through doorways. You'll reduce the chance of striking another person with the front of the ladder.

When you transport a ladder in a truck or a trailer, make sure that it's properly supported parallel to the bed. Pad the support points with soft, non-abrasive material such as rubber or carpeting and tie the ladder securely to eliminate chafing and road shock.

### Important ladder rules

#### Subdivision 3/X rules

- 1926.1053, Ladders
- 437-003-0065, Extension ladders
- 1926.1060, Training requirements

#### Ladder rules frequently cited by OR-OSHA

- 1926.1053(b)(1), Portable ladders do not extend three feet above an upper landing.
- 1926.1053(b)(4), Ladders not used for their designed purpose.



# Construction Depot

A newsletter for the construction industry

QUARTERLY

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Fall 2005

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This issue of the **Construction Depot** focuses on ladder safety – how to select them and use them properly. Portable ladders are easy to use and among the most practical tools available to construction workers. However, more workers are injured by falls from ladders than falls from roofs or any other elevated surface. **In this issue:** ■ **Selecting portable ladders** ■ **Using ladders safely** ■ **Ladder inspection, maintenance, and repair** ■ **Storing ladders** ■ **Transporting ladders** ■ **A checklist of safe practices** ■

### How accidents happen — an example

Accident type ..... Fall  
Industry ..... Cable installation  
Employee job title ..... Cable splicer

#### Accident description

A cable splicer was attempting to relocate a cable TV service tap to a nearby utility pole in a suburban Portland neighborhood. To gain access to the cable connection terminals, the splicer used an extension hook ladder hung from the overhead cable strand. The ladder was not secured to the cables and became disconnected from the cable strand, causing the splicer to fall to the pavement. The splicer was not wearing a hard hat at the time of the accident. There were no witnesses to the accident, but shortly after it occurred, a passing motorist noticed the injured worker and alerted neighbors and a construction crew working nearby. Emergency personnel were called to the scene to provide medical attention. The splicer had suffered traumatic head injuries in the fall and died at the scene.



#### Investigation findings

The cable splicer was not wearing a hard hat or a high-visibility vest for working in traffic. Traffic controls were not in place to protect the area where the splicer was working. The work site had not been evaluated for safety hazards. A safety strap had not connected the ladder to the cable strand. Adequate supervision of the employee at the work site had not been provided by the employer.

#### Applicable standards:

- 1910.268 (e) – Telecommunications, tools and PPE
- 437-002-0316 (3)(a) – Oregon rules for telecommunications, hazard evaluations
- 437-002-0316 (6)(a) – Ladder hooks
- 437-001-760 (1)(a) – Employer’s responsibilities, instruction and supervision