



Loss Control TIPS

Technical Information Paper Series

Innovative Safety and Health SolutionsSM

Job-Built Ladders

Introduction

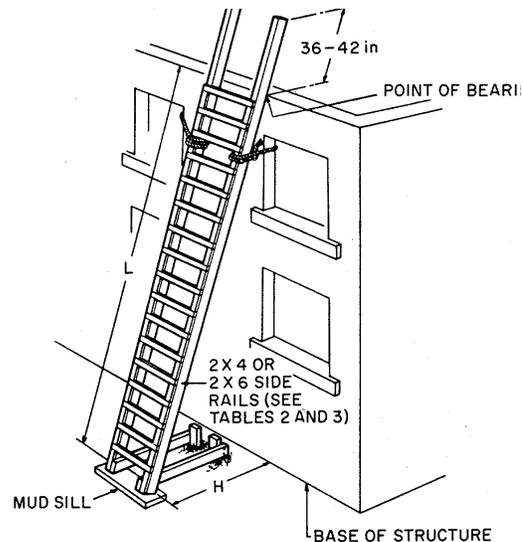
Job-built ladders are commonly used on construction job sites. Job-built ladders are heavy duty in nature and custom-made for specific jobs. Their primary purpose is to provide access or egress from a work area. They are not designed to be used as workstations. They are used only until a particular phase of work is complete or until permanent stairways or fixed ladders are ready for use.

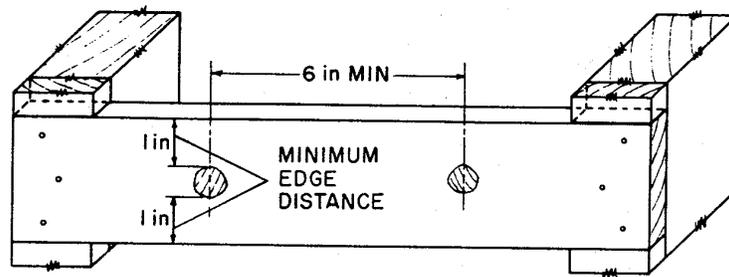
Materials

Wood used for a job-built ladder should be seasoned to a moisture content of not more than 19 percent. The wood should be machined and dressed on all sides so that it is free of sharp edges and splinters. The side rails of the ladder should be stamped with an American Lumber Standards Committee grade mark. Minimum fiber stress for side rails should be at least 1,200 pounds per square inch.

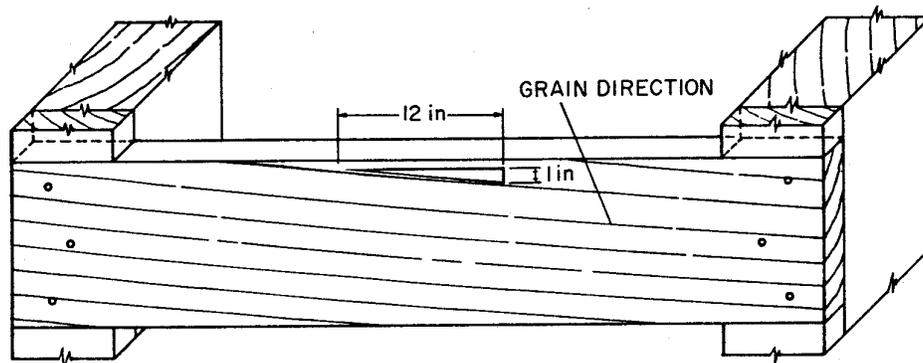
Cleats (also called rungs or steps) used in the ladder should be nominal 1 x 4 (0.75 X 3.5 inches actual). Since board materials are not normally subject to stress grade rules, inspect the ladder on site prior to installation or use. Ensure that the cleats are relatively clear of knots. Tight knots in the side face of less than 3/4 inch in diameter are acceptable, but they must number no more than two and they must be greater than six inches apart. Also, be sure the knots do not occur closer than 1 inch from the edge of the cleat.

Ensure that there are no knots in the narrow face of the cleat. The slope of the grain of the cleat to a line parallel to the sides of the cleat should not be greater than 1 in 12.





An alternative wood to use for the cleats is nominal 2 x 4 (1.5 x 3.5 inches actual) stress grade dimension lumber.



Construction

Job-built ladders are usually custom built for their intended use. If the job-built ladder is to provide the only means of egress for 25 or more workers from the elevated work area or if simultaneous two way traffic is expected, use a double cleat ladder. (A double cleat ladder has two side rails and a common center rail.)

The *working length* of a single or double cleated ladder should not exceed 24 feet. If the length required is more than 24 feet, construct a perimeter protected platform between the ladders. Stagger the upper and lower ladders so that the platform must be used. Ensure that railings extend 36 inches to 42 inches above the platform to allow workers to have a hand hold while they are mounting or dismounting the ladder.

The *width* of a single cleated ladder should be between 16 and 20 inches measured inside the side rails, and should be uniform throughout the climb. The width of double cleated ladders should be between 18 and 22 inches, measured inside the side rail and center. The cleats should be continuous between the outside parallel rails.

The *pitch* of the ladder should not be greater than four times the horizontal base distance. The ladder may be installed at a steeper pitch, but it must not go beyond vertical.

The *side load capacity* of the rails is a function of working length and pitch. Minimum rail size should comply with the following tables.

Table 1. Minimum Rail Size for Single Cleat Ladders

Working Length	Vertical	Pitch (H/L)			
		1/10	1/8	1/6	1/4
12 feet	2" x 4"	2" x 4"	2" x 4"	2" x 4"	2" x 4"
14 feet	2" x 4"	2" x 4"	2" x 4"	2" x 4"	2" x 4"
16 feet	2" x 4"	2" x 4"	2" x 4"	2" x 4"	2" x 6"
18 feet	2" x 4"	2" x 4"	2" x 4"	2" x 6"	2" x 6"
20 feet	2" x 4"	2" x 4"	2" x 6"	2" x 6"	2" x 6"
22 feet	2" x 4"	2" x 6"	2" x 6"	2" x 6"	2" x 6"
24 feet	2" x 4"	2" x 6"	2" x 6"	2" x 6"	2" x 6"

Table 2. Minimum Rail Size for Double Cleat Ladders

Working Length	Vertical	Pitch (H/L)			
		1/10	1/8	1/6	1/4
12 feet	2" x 4"	2" x 4"	2" x 4"	2" x 4"	2" x 4"
14 feet	2" x 4"	2" x 4"	2" x 4"	2" x 4"	2" x 6"
16 feet	2" x 4"	2" x 4"	2" x 6"	2" x 6"	2" x 6"
18 feet	2" x 4"	2" x 6"	2" x 6"	2" x 6"	2" x 6"
20 feet	2" x 4"	2" x 6"	2" x 6"	2" x 6"	2" x 6"
22 feet	2" x 4"	2" x 6"	2" x 6"	2" x 6"	2" x 6"
24 feet	2" x 4"	2" x 6"	2" x 6"	2" x 6"	2" x 6"

Avoid *spliced side rails* if possible. If used, 2" x 4" side rails should be overlapped 30 inches and connected with five uniformly spaced bolts, 1/2 inch in diameter for each rail. For 2" x 6" side rails, the overlap should be 48 inches and connected with 8 bolts, 1/2 inch in diameter.

Make *cleats* of 1" x 4" nominal site-inspected board materials or 2" x 4" nominal stress grade dimension lumber. Ensure that cleats are continuous and extend the full width of double cleated ladders. The cleats should be level and parallel when the ladder is in position for use.

A *cleat attachment* is made to the narrow face of the side rail. For 1" x 4" cleats, use 10D common nails, 3 to each rail. For 2" x 4" cleats, use 12D common nails, 3 to each rail. Stagger the placement of the nails to minimize splitting. When using wood species prone to splitting, drill lead holes. Use filler blocks of the same thickness of lumber used in the cleats to fill in between the cleats. Do not use dapping (cutting into the side rails) to receive the cleat).

Ensure that *cleat spacing* is uniform from the base of the ladder to the top support point. The distance between the cleats, from top to top, should be 12 inches.

For more information, contact your local Hartford agent or your Hartford Loss Control Consultant. Visit The Hartford's Loss Control web site at <http://www.thehartford.com/corporate/losscontrol/>

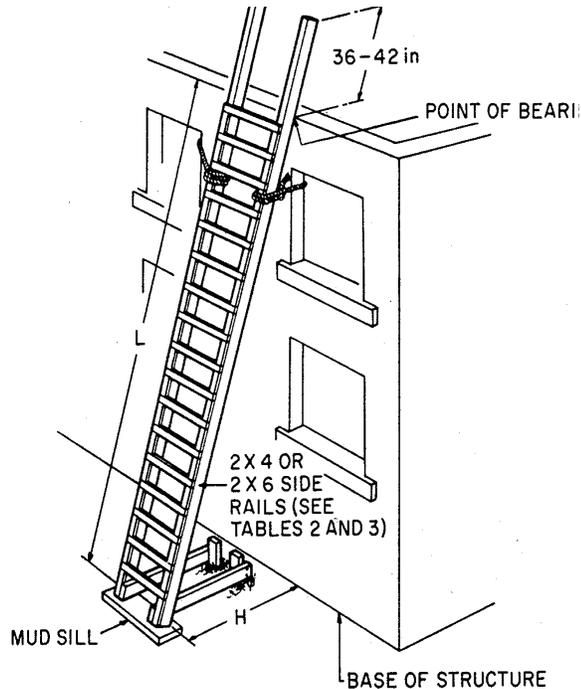
This document is provided for information purposes only. It is not intended to be a substitute for individual legal counsel or advice on issues discussed within. Readers seeking resolution of specific legal issues or business concerns related to the captioned topic should consult their attorneys and/or insurance representatives.



Safety Checklist: Job-Built Ladders

Installation Guidelines

- Always set ladders on firm bearing surfaces.
- Never place ladders on loose soil or in doorways, passageways, drives or in any location that may be displaced by activity.
- Position the ladder from a pitch of vertical to 1 in 4.
- Fasten the ladder firmly to a secure object as near as possible to the top bearing point.
- Secure the ladder base against accidental displacement.
- Attach security attachments directly to the side rails, not the cleats.
- Provide a safe landing at the top of each ladder.



Inspection And Maintenance

- Inspect all job-built ladders, landings and lashings at least weekly. Immediately correct any defects identified during the inspection.
- Repair broken or missing ladder components.
- Keep the cleats free of oil, grease, ice, and mud.
- Check bolted splices to ensure that the nuts are tight.
- Maintain good housekeeping at the base and top of the ladder.
- If protective coatings are used, use only transparent coatings; never use opaque coatings.

Safety

- Clean boots of mud, snow, grease, or oil prior to mounting the ladder.
- To dismount at the top of the ladder, step through the rails, not around them.
- Always face the ladder and use both hands to climb or descend; never run.
- Use hand lines for handling tools; keep both hands free for safe climbing.
- Remember that job-built ladders are not work stations. (Incidental use is acceptable if a body harness and lifeline are used.)
- Never use a job-built ladder as a guy, brace, or hoist support.