

Ladders, Portable and Fixed

Chapter 296-876 WAC

Resources

HELPFUL TOOLS

Job-Made Wooden LaddersR-3



Notes

Job-Made Wooden Ladders Design and Construction

Use with Ladders, Portable and Fixed, Chapter 296-876 WAC

This Helpful Tool provides information concerning the design and construction of job-made wooden ladders. Ladders that are built according to these specifications will be considered to meet the requirements of Design and Construction, WAC 296-876-20005.

GENERAL REQUIREMENTS

- All ladder component surfaces are finished to avoid injury to employees and to prevent snagging of clothing.
- Working length isn't greater than 24 feet.
- Fasteners are driven full length and countersunk not more than 1/8 inch.



Note:

Fasteners include plain-shank and helically-threaded steel nails. Staples and wood screws of equivalent shank withdrawal, head pull-through, and bending/shear resistance (as determined by test data or published formulas and tabulated values) may also be used.



Definition:

Equivalent means an alternative design, material or method to protect against a hazard. You have to demonstrate it provides an equal or greater degree of safety for employees than the method, material or design specified in the rule.

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MATERIALS

- Wood parts are seasoned to moisture content of not more than 19 percent.
- Side rails and cleats are made from stress-grade lumber that meets the minimum grades shown in Table HT-1, Accessible stress-grade lumber for job-made ladders.
- Cleats are nominal 2x4 stress-grade dimension lumber.
- Material used for side rails meets the minimum dimensions of:
 - Table HT-2, Minimum Rail Size for Single-Cleat Ladders
 - or**
 - Table HT-3, Minimum Rail Size for Double-Cleat Ladders



Note:

Minimum dimensions for side rails are based on the ladder being set-up at the proper angle. See Set-up, WAC 296-876-40020.



Definitions:

- **Double-cleat ladder** is a job-made ladder with two side rails and a center rail connected with continuous cleats. It allows personnel to climb and descend at the same time.
- **Single-cleat ladder** is a ladder consisting of a pair of side rails connected by cleats, rungs, or steps.
- **Stress-grade lumber** is lumber that has been assigned allowable stress (allowable stress design) or reference strengths (load resistance factor design) values. It is identified by the grademark or certificate of inspection issued by a lumber inspection bureau or agency accredited by the Board of Review of the American Lumber Standard Committee. The grademark specifies the grade, species, and dryness of the lumber.

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SIDE RAILS

- The minimum clear distance between rails is:
 - Uniform throughout the length of climb**and**
 - At least:
 - 16 inches but not greater than 20 inches for single-cleat ladders
 - 18 inches but not greater than 22 inches for double-cleat ladders
- If splicing is required to obtain the necessary ladder length, the resulting side rail:
 - Doesn't have more than one splice, located as close to the top point of bearing as possible**and**
 - Is equivalent in strength to a one-piece side rail made of the same material
- Side rails, if required, are spliced using bolts with a nut and lock washer below the nut. Bolts are either:
 - Common steel bolts with a one inch diameter, $\frac{3}{32}$ inch thick steel washer under the bolt head**or**
 - $\frac{1}{2}$ inch diameter carriage bolts



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CLEATS

- Cleats are:
 - Parallel and level when the ladder is in position to be used
and
 - Evenly spaced throughout the length of the ladder from the base to the top point of bearing.
- The distance from the top of a cleat to the top of an adjacent cleat is at least 8 inches but not greater than 12 inches.
- Cleats on double-cleat ladders are continuous and extend the full width of the ladder.

ATTACHING CLEATS

- Cleats are attached to the narrow face of each side rail by three $3\frac{1}{4}$ inch long 12-d common nails, or an equivalent set of fasteners.
- Filler blocks are used between cleats. Side rails aren't cut to inset cleats.
- Filler blocks are:
 - The same thickness as the cleats
 - Butted tightly against the underside of each cleat
 - Attached to the side rails by three $3\frac{1}{4}$ inch long 12-d common nails, or an equivalent set of fasteners.

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Table HT-1

Acceptable Stress-Grade Lumber for Job-Made Ladders

Species for Visual Grades and Machine Grading Acronyms	Minimum Grade
Aspen	Select Structural
Beech-Birch-Hickory	No. 2
Cottonwood	Select Structural
Douglas Fir-Larch	No. 2
Douglas Fir-Larch (north)	No. 1/No. 2
Douglas Fir-Larch (south)	No. 2
Eastern Hemlock-Tamarack	Select Structural
Eastern Softwoods	Select Structural
Eastern White Pine	Select Structural
Hem-Fir	No. 2
Hem-Fir (north)	No.1/No. 2
Mixed Maple	Select Structural
Mixed Oak	No. 2
Northern Red Oak	No. 2
Northern Species	Select Structural
Red Maple	No. 2
Red Oak	No. 2
Redwood	No. 1
Spruce-Pine-Fir	No. 1/No. 2
Spruce-Pine-Fir (south)	No. 1
Southern Pine	No. 2 (nondense)
Western Cedars	Select Structural
Western Woods	Select Structural
White Oak	No. 2
Yellow Poplar	Select Structural
MSR	1200f-1.2E
MEL	M-7
<p>Note: The allowable stress in bending after adjustment for size, F_b, shall not be less than 1200 psi (pound-force per square inch) and the corresponding reference strength (for Load and Resistance Factor Design) shall not be less than 3.05 ksi (kips-force per square inch)</p>	

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Table HT-2
Minimum Rail Size for Single-Cleat Ladders
(Nominal-Dimension Lumber)

Working Length (feet)	Spliced Side Rail	Continuous Side Rail
12 or less	2 x 4	2 x 4
14	2 x 4	2 x 4
16	2 x 4	2 x 6
18	2 x 4	2 x 6
20	2 x 6	2 x 6
22	2 x 6	2 x 6
24	2 x 6	2 x 6

Table HT-3
Minimum Rail Size for Double-Cleat Ladders
(Nominal-Dimension Lumber)

Working Length (feet)	Spliced Side Rail	Continuous Side Rail
12 or less	2 x 4	2 x 4
14	2 x 4	2 x 6
16	2 x 6	2 x 6
18	2 x 6	2 x 6
20	2 x 6	Stresses exceed capacity of 2 x 6 rails
22	2 x 6	
24	2 x 6	

