

## Appendix E

# Guardrail Specifications

To achieve the strength required in Table E.1, wooden guardrails that use the configuration and post spacing shown in Table E.2 must be made from “selected lumber” as defined by Cal/OSHA. In practical terms, for a 2x4, “selected lumber” means equivalent in strength to No.1 Douglas Fir, such as No.1 & Better Douglas Fir, Select Structural Fir Hemlock, or Select Structural Southern Pine.

The strength requirements (Table E.1) can also be met using No. 2 grade 2x4 if stronger construction methods are used, such as assembling the 2x4 rail with the 2x4 rail with a topcap as shown in Figure E.1 or doubling the lumber on the rails.

**Table E.1** Standard Guardrails Minimum Strength Requirements

<b>Top Rail Strength Requirement</b>	Capable of withstanding, without failure, a force of at least 200 lb. applied to the top rail.
<b>Max Deflection</b>	200-lb. test load, applied downward, guardrail shall not deflect to a height less than 39 in. above the walking/working level.
<b>Midrail Strength Requirement</b>	Mid-rails, screens, mesh, intermediate vertical members, solid panels, and equivalent members shall be capable of withstanding, without failure, a force of at least 150 lb. applied in any downward or outward direction at any point.

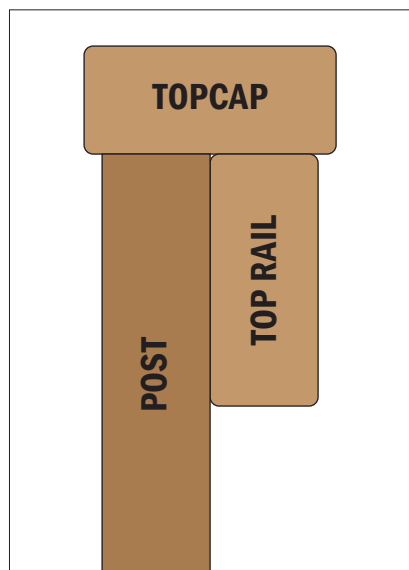
Notes:

A. For mobile scaffolds used for general industry activities the strength requirement for guardrails is stated differently. It requires that guardrails, including their connectors and anchorage shall be designed for a live load of 20 lb. per linear foot applied either horizontally or vertically downward at the top rail. The specifications shown in Tables H.2 and H.3 conform to this requirement (Cal/OSHA Section 3209).



**Table E.2** Wooden Guardrail Specifications

<b>Wood</b>	Selected lumber free from damage that affects its strength
<b>Posts</b>	At least 2 × 4 in. nominal dimensions, spaced 8 ft. or closer. <sup>A</sup>
<b>Top Rails</b>	2 × 4-inch material or larger, smooth surfaced, or double 1 × 4-in. nominal members as shown in Figure E.1.
<b>Midrails</b>	At least 2 × 4.
Notes: A. The maximum post spacing with 2 x 4 top rails is reduced to 6 ft. for mobile scaffolds used for general industry activities.	



**Figure E.1.** A double rail constructed in an L configuration provides a stronger guardrail.

**Table E.3** Pipe Guardrail Specifications

<b>Posts</b>	1½ in. O.D. or larger, standard metal pipe spaced at not more than 8 ft.
<b>Top Rail and Midrail</b>	1½ in. O.D. or larger
Notes: Posts and rails of 1 inch x .070 inch wall steel tubing; or 1.990 inch x .058 inch wall aluminum tubing are equivalent. See Cal/OSHA Section 3209, Standard Guardrails, for specifications of structural metal (angle iron).	

**Table E.4** Toeboard Specifications (Cal/OSHA)

<b>Minimum Height</b>	3½ in. (4-in. nominal is acceptable).
<b>Clearance to Platform</b>	Not more than ¼-inch clearance above platform level.
<b>Toeboard Material</b>	Wood, concrete, metal, or other substantial material. Where constructed of metal grille, mesh openings shall not be greater than one inch.
<b>Falling Object Protection (where standard toeboard does not provide adequate protection)</b>	Paneling or screening from platform to intermediate rail or top rail shall be provided. (Material such as No. 18 gauge U.S. Standard wire 1-in. mesh complies with the requirement for filling the space between the toeboard and intermediate rail.)

**Fed OSHA Requirement: Toeboard Requirements**

In addition to wearing hardhats each employee on a scaffold shall be provided with additional protection from falling hand tools, debris, and other small objects through the installation of toeboards, screens, or guardrail systems, or through the erection of debris nets, catch platforms, or canopy structures that contain or deflect the falling objects. Where there is a danger of tools, materials, or equipment falling from a scaffold and striking employees below, the following provisions apply. A toeboard shall be erected along the edge of platforms more than 10 feet (3.1 m) above lower levels for a distance sufficient to protect employees below. Where used, toeboards shall be capable of withstanding, without failure, a force of at least 50 lb. applied in any downward or horizontal direction at any point along the toeboard. (29 CFR §1926.451(h)(4).)