

PRINCETON PLASMA PHYSICS LABORATORY	ENGINEERING STANDARD	No. ES-MECH-009, Rev. 1 Page 1 of 4
Subject: Design, Construction and Inspection of Wooden Stairs and Platforms	Effective Date: 5/1/18	Initiated: Fabrication Group Head, Engineering Department
	Supersedes: R0, 1/29/10	Approved: Engineering Department Head

Applicability: This Engineering Standard applies to all new and existing stairs, platforms and structures to support people that use components made of wood or wood products. It applies to both outdoor and indoor installations.

Introduction: This Standard provides the criteria for designing, constructing and performing inspections of all stairs and platforms that use components made of wood or wood products, as well as the inspection and maintenance requirements for these wooden structures. Existing structures will need to be retrofitted/rebuilt to comply with this standard.

Reference Documents:

International Building Code (Section 1009 on Stairways, Section 1010 on Ramps, and Section 1012 on Handrails)

29CFR1926.1052, Stairways section of OSHA Construction Industry Regulations

Design and Construction Requirements:

The design and construction of interior and exterior wooden stairs and/or platforms must be done as follows:

1. Pre-engineered and fabricated stairs and platforms that meet OSHA or International Building Code requirements should be used whenever possible. The capacity must be at least 100 psf and be capable of withstanding at least 300 # on a 4 square inch area of the stair treads.
2. If stick-built stairs or platforms are used, the design must be approved in writing by a Qualified Engineer appointed by the Engineering Department Head (see list available on the PPPL Engineering Department Webpage) and be based on the guidance in the International Building Code and the "Prescriptive Residential Deck Construction Guide" issued by the AFPA. The capacity must be at least 100 psf and be capable of withstanding at least 300 # load on a 4 square inch area of the stair treads. When pressure treated wood is used, all fasteners must be 304/316 stainless steel or triple galvanized or approved for use with ACQ (alkaline copper quaternary) wood.
3. Stick-built stairs must be:
 - a. at least 36" wide for an occupant load of less than 50, otherwise the minimum width is 44".
 - b. have at least three stringers
 - c. have treads with a capacity of at least 300#
 - d. have non-skid surface treatment on treads
 - e. constructed of composite material when available and appropriate
4. All platforms serving as landings to building/facility egress points shall be of sufficient size to allow for door swing and at least one person on the landing. Landings shall be no greater than 1½" below the threshold of the doorway.
5. All locations of work platforms and stairways that provide egress from office type facilities and trailers shall have local lighting.

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6. All stairs and platforms greater than 30" above grade are required to have a guard and handrails that comply with International Building Code or OSHA requirements. Handrails must be rated for 50 plf and be capable of withstanding a side load of 200# at any point.
7. All exterior wood structures that are considered permanent (greater than 90 days of service) must have foundations sized to support the load and extend at least 42" below grade surface. Stairs shall terminate on a sidewalk, concrete pad or asphalt pad. All wood structures shall be anchored to prevent wind lift or overturn when the International Building Code requires such anchoring.
8. Ramps that are to provide handicapped access shall meet ADA requirements for width, slope, railing treatment, length of sloped run, and landing size/location as specified in the ADA Standards for Accessible Design, 28 CFR Part 36.
9. The installation of all stairs and platforms, whether pre-fabricated or built on-site, must be inspected by one of the individuals listed in item #4 of the Inspection Requirements below. The person must approve the installation in writing before the stairs and/or platform can be used.
10. Portable stairs must comply with all OSHA requirements.
11. Additional requirements from the building code:
 - **Headroom.** Stairways shall have a headroom clearance of not less than 80 inches (2032 mm) measured vertically from a line connecting the edge of the nosings. Such headroom shall be continuous above the stairway to the point where the line intersects the landing below, one tread depth beyond the bottom riser. The minimum clearance shall be maintained the full width of the stairway and landing.
 - **Riser height and tread depth.** Stair riser heights shall be 7 inches (178 mm) maximum and 4 inches (102 mm) minimum. The riser height shall be measured vertically between the nosings of adjacent treads. Rectangular tread depths shall be 11 inches (279 mm) minimum measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's nosing. Winder treads shall have a minimum tread depth of 11 inches (279 mm) between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline and a minimum tread depth of 10 inches (254 mm) within the clear width of the stair.
 - **Stairway landings.** There shall be a floor or landing at the top and bottom of each stairway. The width of landings shall be not less than the width of stairways served. Every landing shall have a minimum width measured perpendicular to the direction of travel equal to the width of the stairway. Where the stairway has a straight run the depth need not exceed 48 inches (1219 mm). Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing. Where wheelchair spaces are required on the stairway landing in accordance with Section 1009.6.3, the wheelchair space shall not be located in the required width of the landing and doors shall not swing over the wheelchair spaces.
 - **Outdoor conditions.** Outdoor stairways and outdoor approaches to stairways shall be designed so that water will not accumulate on walking surfaces.
 - **Vertical rise.** A flight of stairs shall not have a vertical rise greater than 12 feet (3658 mm) between floor levels or landings.
 - **Handrail Height.** Handrail height, measured above stair tread nosings, or finish surface of ramp slope, shall be uniform, not less than 34 inches (864 mm) and not more than 38 inches (965 mm). Handrail height of alternating tread devices and ships ladders, measured above tread nosings, shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).
 - **Guardrail Height.** Required guards shall be not less than 42 inches (1067 mm) high, measured vertically

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Inspection Requirements:

1. Inspections before use shall verify compliance with
 - a. The applicable sections of the International Building Code
 - b. The stairways section of OSHA Construction Industry Regulations, 29CFR1926.1052, as applicable
 - c. This Standard
2. Inspections before use shall also determine if the following are acceptable:
 - a. Structural integrity of the existing design
 - b. Condition of materials (fastener corrosion and wood splitting, checking and cupping)
 - c. Surface condition to prevent slippage (mold, water retention, etc.)
 - d. Meets ADA requirements where applicable
3. Annual inspections shall look for:
 - a. Damage to any component and its impact on the structural integrity
 - b. Loose joints or fasteners
 - c. Condition of materials (fastener corrosion and wood splitting, checking and cupping)
 - d. The need for re-sealing or re-painting to prevent deterioration (water must bead on surface)
4. Initial inspections must be performed and documented by a Qualified Engineer. Annual inspections must be performed and documented by a Qualified Engineer or a trained Platform Inspector. A list of engineers trained on the job by a Qualified Engineer and appointed by the Engineering Department Head for Initial and Annual inspections respectively is available on the PPPL Engineering Department Webpage.
5. Records of inspections and preventative maintenance will be kept by the Fabrication Group Head, who can loan them to the Platform Inspector.

Inspection of Wooden Stairs/Ramps/Platforms

Structure Number: _____

Location: _____

Description: _____

Inspection Type: Prior to Initial Use ☐ Annual ☐

Inspection Prior to Initial Use Requirements		Satisfactory
1.	Verify compliance with Engineering Standard ES-MECH-009	<input type="checkbox"/>
2.	Verify compliance with the following requirements: <ul style="list-style-type: none"> International Building Code <ul style="list-style-type: none"> Stairs <input type="checkbox"/> Ramps <input type="checkbox"/> Platforms / Landings <input type="checkbox"/> Railings <input type="checkbox"/> Handrails <input type="checkbox"/> The stairways section of OSHA Construction Industry Regulations, 29CFR1926.1052, as applicable 	<input type="checkbox"/>
3.	Determine if the following items are acceptable: <ul style="list-style-type: none"> Structural integrity of the existing design <input type="checkbox"/> Condition of materials (wood splitting, checking and cupping) <input type="checkbox"/> Surface condition to prevent slippage (anti-slip tape or paint) <input type="checkbox"/> Sealing or painting of wood used outside <input type="checkbox"/> Meets ADA requirements where applicable <input type="checkbox"/> 	<input type="checkbox"/>

Annual Inspection Requirements	
1.	Inspections should check for the following: <ul style="list-style-type: none"> Damage to any component and its impact on the structural integrity <input type="checkbox"/> Loose joints or fasteners <input type="checkbox"/> Condition of materials (fastener corrosion and wood splitting, checking and cupping) <input type="checkbox"/> The need for re-sealing or re-painting to prevent deterioration (water must bead on surface) <input type="checkbox"/>

Comments: _____

Inspection Performed by: _____ Date: _____

Records of inspections and preventative maintenance will be kept by the Fabrication Group Head.