

# **PROCEDURE FOR THE DESIGN AND USE OF STAIRS AND LADDERS**



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## **INTRODUCTION**

### **AUTHORITY FOR IMPLEMENTATION OF REGULATIONS FOR STAIRWAYS AND LADDERS**

The Occupational Safety and Health Act under 29 CFR 1926 Subpart X establishes requirements relating to stairways and ladders. In response to the regulatory mandate, Steingass Mechanical Contracting, Inc. has developed and will maintain compliance to these requirements through the following procedure.

## **PURPOSE**

This document was designed with the intent of meeting the minimal requirements necessary to maintain compliance to the applicable section of the regulations. It applies to all stairways and ladders used in construction, alteration, repair (including painting and decorating), and demolition workplaces covered under 29 CFR part 1926, and also sets forth, in specified circumstances, when ladders and stairways are required to be provided. (Every attempt has been made to present this material in a simple format for interpretation on the job. Where confusion occurs reference to the actual regulation is recommended.) In addition, the following section shall serve as guidelines for employee training.

## **RESPONSIBILITY**

Steingass Mechanical Contracting, Inc. shall instruct all appropriate employees in the necessity to work in a safe manner and to the content of this document. In addition, Steingass Mechanical Contracting, Inc. considers these requirements to be of critical importance. All employees require strict adherence. Enforcement of this procedure is required to be in compliance with OSHA regulations. Any variance from it shall be considered a work rule violation and, because of the serious nature of this matter, disciplinary action will be taken in accordance with the disciplinary guidelines described in **Steingass Mechanical Contracting, Inc.'s Safety Rules and Regulations.**

## **GLOSSARY OF TERMS**

**Cleat:** A ladder cross piece of rectangular cross- section placed on edge upon which a person may step while ascending or descending a ladder.

**Double-cleat ladder:** A ladder similar in construction to a single-cleat ladder, but with a center rail to allow simultaneous two-way traffic for employees ascending or descending.

**Equivalent:** Alternative designs, materials, or methods that the employer can demonstrate will provide an equal or greater degree of safety for employees than the method or item specified in the standard.

**Extension trestle ladder:** A self-supporting portable ladder, adjustable in length, consisting of a trestle ladder base and a vertically adjustable extension section, with a suitable means for locking the ladders together.

**Failure:** Load refusal, breakage, or separation of component parts. Load refusal is the point where the structural members lose their ability to carry the loads.

**Fixed ladder:** A ladder that cannot be readily moved or carried because it is an integral part of a building or structure. A **step-side fixed ladder** is a fixed ladder that requires a person getting off at the top to step to the side of the ladder side rails to reach the landing. A **through fixed ladder** is a fixed ladder that requires a person getting off at the top to step between the side rails of the ladder to reach the landing.

**Handrail:** A rail used to provide employees with a handhold for support.

**Individual-rung/step ladders:** Ladders without a side rail or center rail support.

Mounting individual steps or rungs directly to the side or wall of the structure makes such ladders.

**Job-made ladder:** A ladder that is fabricated by employees, typically at the construction site, and is not commercially manufactured. This definition does not apply to any individual-rung/step ladders.

**Lower levels:** Those areas to which an employee can fall from a stairway or ladder. Such areas include ground levels, floors, roofs, ramps, runways, excavations, pits, tanks, material, water, equipment, and similar surfaces. It does not include the surface from which the employee falls.

**Maximum intended load:** The total load of all employees, equipment, tools, materials, transmitted loads, and other loads anticipated to be applied to a ladder component at any one time.

**Nosing:** That portion of a tread projecting beyond the face of the riser immediately below.

**Point of access:** All areas used by employees for work-related passage from one area or level to another. Such open areas include doorways, passageways, stairway openings, studded walls, and various other permanent or temporary openings used for such travel.

**Portable ladder:** A ladder that can be moved or carried.

**Riser height:** The vertical distance from the top of a tread to the top of the next higher tread or platform/landing or the distance from the top of a platform/landing to the top of the next higher tread or platform/landing.

**Side-step fixed ladder:** See "**Fixed Ladder.**"

**Single-cleat ladder:** A ladder consisting of a pair of side rails, connected together by cleats, rungs, or steps.

**Single-rail ladder:** A portable ladder with rungs, cleats, or steps mounted on a single rail instead of the normal two rails used on most other ladders.

**Spiral stairway:** A series of steps attached to a vertical pole and progressing upward in a winding fashion within a cylindrical space.

**Stair rail system:** A vertical barrier erected along the unprotected sides and edges of a stairway to prevent employees from falling to lower levels. The top surface of a stair rail system may also be a "**handrail.**"

**Step stool (ladder type):** A self-supporting, foldable, portable ladder, nonadjustable in length, 32 inches or less in overall size, with flat steps and without a pail shelf, designed to be climbed on the ladder top cap as well as all steps. The side rails may continue above the top cap.

**Through fixed ladder:** See "**Fixed Ladder.**"

**Tread depth:** The horizontal distance from front to back of a tread  
(*excluding nosing, if any.*)

**Unprotected sides and edges:** Any side or edge (except at entrances to points of access) of a stairway where there is no stair rail system or wall 36 inches (.9 m) or more in height, and any side or edge (except at entrances to points of access) of a stairway landing, or ladder platform where there is no wall or guardrail system 39 inches (1 m) or more in height.

**GENERAL REQUIREMENTS**  
**WHEN TO PROVIDE A STAIRWAY OR LADDER**

Steingass Mechanical Contracting, Inc. shall provide and install all stairway and ladder fall protection systems required by this subpart and shall comply with all other pertinent requirements of this subpart before employees begin the work that necessitates the installation and use of stairways, ladders, and their respective fall protection systems.

A stairway or ladder shall be provided at all personnel points of access where there is a break in elevation of 19 inches (48 cm) or more, and no ramp, runway, sloped embankment, or personnel hoist is provided.

- 1) Do not use non-permanent spiral stairways.
- 2) A double-cleated ladder or two or more separate ladders shall be provided when 25 or more employees are expected to use it.
- 2a) A double-cleated ladder or two or more separate ladders shall be provided when a ladder is to serve simultaneous two-way traffic.
- 3) If an access is intended for use, keep it clear to permit free passage. If access must be restricted an alternate point of access must be provided.
- 4) When a building or structure has two or more points of access between levels, at least one point of access shall be kept clear to permit free passage of employees.



## **STAIRWAY REQUIREMENTS**

- 1) Stairways that will not be a permanent part of the structure on which construction work is being performed shall have landings of not less than 30 inches (76 cm) in the direction of travel and extend at least 22 inches (56 cm) in width at every 12 feet (3.7 m) or less of vertical rise.
- 2) Stairs shall be installed between 30 deg and 50 deg from horizontal.
- 3) Riser height and tread depth shall be uniform within each flight of stairs, including the first step. Variations in riser height or tread depth shall not be over 1/4-inch (0.6 cm) in any stairway system.
- 4) Where doors or gates open directly on a stairway, a platform shall be provided, and the swing of the door shall not reduce the effective width of the platform to less than 20 inches (51 cm).
- 5) Metal pan landings and metal pan trends, when used, shall be secured in place before filling with concrete or other material.
- 6) All parts of stairways shall be free of hazardous projections, such as protruding nails.
- 7) Slippery conditions on stairways shall be eliminated before the stairways are used to reach other levels.

## **TEMPORARY SERVICE**

- 1) Pan stairs must be filled or covered before they are used as an access.
- 2) Skeleton metal stairs must be fitted with secured temporary treads and landings long enough to cover the entire tread and/or landing area before they are used as an access.
- 3) Treads for temporary service shall be made of wood or other solid material, and shall be installed for full width and depth of the stair.

## **STAIRRAILS AND HANDRAILS**

- 1) Stairways having four or more risers or rising more than 30 inches (76 cm), whichever is less, shall be equipped with at least one handrail; and one stair rail system along each unprotected side or edge.  
**See 7 below.**
- 2) Winding and spiral stairways shall be equipped with a handrail offset sufficiently to prevent walking on those portions of the stairways where the tread width is less than 6 inches (15 cm).
- 3) The height of stair rails shall be not less than 36 inches (91.5 cm) from the upper surface of the stair rail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

- 4) Mid rails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members, shall be provided between the top rail of the stair rail system and the stairway steps.
  - (i) Mid rails, when used, shall be located at a height midway between the top edge of the stair rail system and the stairway steps.
  - (ii) Screens or mesh, when used, shall extend from the top rail to the stairway step, and along the entire opening between top rail supports.
  - (iii) When intermediate vertical members, such as balusters, are used between posts, they shall be not more than 19 inches (48 cm) wide.
  - (iv) Other structural members, when used, shall be installed such that there are no openings in the stair rail system that are more than 19 inches (48 cm) apart.
- 5) Handrails and the top rails of stair rail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 n) applied within 2 inches (5 cm) of the top edge, in any downward or outward direction, at any point along the edge.
- 6) The top of the handrails shall be between 30 inches (76 cm) and 37 inches (94 cm) from the upper surface of the handrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

- 7) When the top edge of a stair rail system also serves as a handrail, its top shall be between 36 inches (91.5 cm) and 37 inches (94 cm) from the surface of the handrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.
- 8) Stair rail system and handrails shall be so surfaced as to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.
- 9) Handrails shall provide an adequate handhold for employees grasping them to avoid falling.
- 10) The ends of stair rail systems and handrails shall be constructed so as not to constitute a projection hazard.
- 11) Handrails that will not be a permanent part of the structure being built shall have a minimum clearance of 3 inches (8 cm) between the handrail and walls, stair rail systems, and other objects.
- 12) Unprotected sides and edges of stairway landings shall be provided with guardrail systems. Guardrail system criteria are contained in subpart M of this part.

## LADDERS

**The following requirements apply to all ladders as indicated including job-made ladders:**

- 1) Steingass Mechanical Contracting, Inc. shall visually inspect all ladders periodically.
- 2) All defective ladders will be tagged and placed out of service.
- 3) Ladders shall be designed to meet the requirements of Appendix A.
- 4) Ladder rungs, cleats, and steps shall be parallel, level, and uniformly spaced when the ladder is in position for use.
- 5) Rungs, cleats and steps
  - (i) On portable ladders shall have a centerline spacing of between 10 inches (25 cm), and 14 inches (36 cm).
  - (ii) Step stools shall have a centerline spacing of between 8 inches, (20 cm) and 12 inches (31 cm).
  - (iii) On the base section of extension trestle ladders shall have a centerline spacing of between 8 inches (20 cm) and 18 inches (46 cm). This shall be between 6 inches, ( 15 cm) and 12 inches, (31 cm) on the extension section.
- 6) The minimum clear distance between the:
  - (i) Sides of individual-rung/step ladders and the minimum clear distance between the side rails of other fixed ladders shall be 16 inches (41 cm).
  - (ii) The minimum clearance between side rails for all portable ladders shall be 11-1/2 inches (29 cm).

- 7) The rungs of individual-rung/step ladders shall be shaped such that employees feet cannot slide off the end of the rungs.
- 8)
  - (i) The rungs and steps of fixed metal ladders manufactured after March 15, 1991, shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize slipping.
  - (ii) The rungs and steps of portable metal ladders shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize slipping
- 9) Ladders shall not be tied or fastened together to provide longer sections unless they are specifically designed for such use.
- 10) A metal spreader or locking device shall be provided on each stepladder to hold the front and back sections in an open position when the ladder is being used.
- 11) When splicing is required to obtain a given length of side rail, the resulting side rail must be at least equivalent in strength to a one-piece side rail made of the same material.
- 12) Except when portable ladders are used to gain access to fixed ladders (such as those on utility towers, billboards, and other structures where the bottom of the fixed ladder is elevated to limit access) when two or more separate ladders are used to reach an elevated work area, the ladders shall be offset with a platform or landing between the ladders. **(See Subpart M of 1926 for details on other requirements.)**

- 13) Ladder components shall be surfaced so as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.
- 14) Wood ladders shall not be coated with any opaque covering, except for identification or warning labels which may be placed on one face only of a side rail.
- 15) The minimum perpendicular clearance between fixed ladder rungs, cleats, and steps, and any obstruction behind the ladder shall be 7 inches (18 cm) except in the case of an elevator pit ladder, for which a minimum perpendicular clearance of 4-1/2 inches (11 cm) is required.
- 16) Maintain a 30- inch clearance on the climbing side of the ladder. (See 15)
- 17) When unavoidable obstructions are encountered on the climbing side of a fixed ladder may be reduced to 24 inches (61 cm), provided that a deflection device is installed to guide employees around the obstruction.
- 18) Through fixed ladders at their point of access/egress shall have a step-across distance of between 7 inches, (18 cm) and 12 inches, (30 cm) as measured from the centerline of the rung.
- 19) Fixed ladders without cages or wells shall have a clear width to the nearest permanent object of at least 15 inches (38 cm) on each side of the centerline of the ladder.

- 20) Fixed ladders shall be provided with cages, wells, ladder safety devices or self-retracting lifelines where the length of climb is less than 24 feet (7.3 m) but the top of the ladder is at a distance greater than 24 feet (7.3 m) above lower levels.
- 21) Where the total length of a climb equals or exceeds 24 feet (7.3 m), fixed ladders shall be equipped with one of the following:
- (i) Ladder safety devices; or
  - (ii) Self-retracting lifelines, and rest platforms at intervals not to exceed 150 feet (45.7 m); or
  - (iii) A cage or well, and multiple ladder sections, each ladder section not to exceed 50 feet (15.2 m) in length. Ladder sections shall be offset from adjacent sections, and landing platforms shall be provided at maximum intervals of 50 feet (15.2 m).
- 22) Cages for fixed ladders shall conform to all of the following:
- (i) Horizontal bands shall be fastened to the side rails of rail ladders or directly to the structure, building or equipment for individual-rung ladders;
  - (ii) Vertical bars shall be on the inside of the horizontal bands and shall be fastened to them;
  - (iii) Cages shall extend not less than 27 inches (68 cm), or more than 30 inches (76 cm) from the centerline of the step or rung (excluding the flare at the bottom of the cage), and shall not be less than 27 inches (68 cm) in width.



- (iv) The inside of the cage shall be clear of projections
- (v) Horizontal bands shall be spaced not more than 4 feet (1.2 m) on center vertically;
- (vi) Vertical bars shall be spaced at intervals not more than 9-1/2 inches (24 cm) on center horizontally;
- (vii) The bottom of the cage shall be at a level not less than 7 feet (2.1 m) nor more than 8 feet (2.4 m) above the point of access to the bottom of the ladder. The bottom of the cage shall be flared not less than 4 inches (10 cm) all around within the distance between the bottom horizontal band and the next higher band;
- (viii) The top of the cage shall be a minimum of 42 inches (1.1 m) above the top of the platform, or the point of access at the top of the ladder, with provision for access to the platform or other point of access.

23) Wells for fixed ladders shall conform to all of the following:

- (i) They shall completely encircle the ladder;
- (ii) They shall be free of projections;
- (iii) Their inside face on the climbing side of the ladder shall extend not less than 27 inches (68 cm) nor more than 30 inches (76 cm) from the centerline of the step or rung;
- (iv) The inside clear width shall be at least 30 inches (76 cm);
- (v) The bottom of the wall on the access side shall start at a level not less than 7 feet (2.1 m) nor more than 8 feet (2.4 m) above the point of access to the bottom of the ladder.

- 24) Ladder safety devices, and related support systems, for fixed ladders shall conform to all of the following:
- (i) They shall be capable of withstanding without failure a drop test consisting of an 18-inch (41 cm) drop of a 500-pound (226 kg) weight:
  - (ii) They shall permit the employee using the device to ascend or descend without continually having to hold, push or pull any part of the device, leaving both hands free for climbing:
  - (iii) They shall be activated within 2 feet (.61 m) after a fall occurs, and limit the descending velocity of an employee to 7 feet/sec. (2.1 m/sec.) or less;
  - (iv) The connection between the carrier of lifeline and the point of attachment to the body or harness shall not exceed 9 inches (23 cm) in length.
- 25) The mounting of ladder safety devices for fixed ladders shall conform to the following:
- (i) Mountings for rigid carriers shall be attached at each end of the carrier, with intermediate mountings, as necessary, spaced along the entire length of the carrier, to provide the strength necessary to stop employees' falls;
  - (ii) Mountings for flexible carriers shall be attached at each end of the carrier. When the system is exposed to wind, cable guides for flexible carriers shall be installed at a minimum spacing of 25 feet (7.6 m) and maximum spacing of 40 feet (12.2 m) along the entire length of the carrier to prevent wind damage to the system.

- (iii) The design and installation of mountings and cable guides shall not reduce the design strength of the ladder.
- 26) The side rails of through or sidestep fixed ladders shall extend 42 inches (1.1 m) above the top of the access level or landing platform served by the ladder. For a parapet ladder the access level shall be the roof if the parapet is cut to permit passage through the parapet; if the parapet is continuous, the access level shall be the top of the parapet.
- 27) For through-fixed-ladder extensions, the steps or rungs shall be omitted from the extension and the extension of the side rails shall be flared to provide not less than 24 inches (61 cm) nor more than 30 inches (76 cm) clearance between side rails. Where ladder safety devices are provided, the maximum clearance between side rails of the extensions shall not exceed 36 inches (91 cm).
- 28) For side-step fixed ladders, the side rails and the steps or rungs shall be continuous in the extension.
- 29) Individual-rung step ladders, except those used where their access openings are covered with manhole covers or hatches, shall extend at least 42 inches (1.1 m) above the access level or landing platform either by the continuation of the rung spacing as horizontal grab bars or by providing vertical grab bars that shall have the same lateral spacing as the vertical legs of the rungs.

## USE OF LADDERS

- 1) When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (.9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grab rail shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.
- 2) Ladders shall be maintained free of oil, grease, and other slipping hazards.
- 3) Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond the manufacturer's rated capacity.
- 4) Ladders shall be used only for the purpose for which they were designed. Ladder shall not be used in a horizontal position or as scaffold. Do not place ladders on top of boxes, barrels, crates, etc.
- 5) (i) Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support). **A 4:1 ratio**  
(ii) Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.

- (iii) Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the backside of the ladder.
- 6) Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.
  - 7) Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.
  - 8) Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.
  - 9) The area around the top and bottom of ladders shall be kept clear.
  - 10) The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.
  - 11) Ladders shall not be moved, shifted, or extended while occupied.

- 12) Ladders shall have nonconductive side rails if they are used where the employee or the ladder could contact exposed energized electrical equipment, except as provided in 1926.951(c)(1) of this part.
- 13) The top or top step of a stepladder shall not be used as a step.
- 14) Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- 15) Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.
- 16) Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "**Do Not Use**" or similar language, and shall be withdrawn from service until repaired.
- 17) Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, or corroded components, shall be withdrawn from service until repaired. The requirement to withdraw a defective ladder from service is satisfied if the ladder is either:

- (i) Immediately tagged with "**Do Not Use**" or similar language;
  - (ii) Marked in a manner that readily identifies it as defective;
  - (iii) Or blocked (such as with a plywood attachment that spans several rungs.
- 18) Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.
- 19) Single-rail ladders shall not be used.
- 20) When ascending or descending a ladder, the user shall face the ladder.
- 21) Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.
- 22) An employee shall not carry any object or load that could cause the employee to lose balance and fall.
- 23) All ladders used in construction must be of a minimum of 250 pound duty rating.
- 24) The jobsite foreman shall ensure that the correct types of ladders are used for the various job functions being performed.





**Steingass Mechanical Contracting, Inc.**  
**Employee Training Statement**

The purpose of this training is to gain an understanding of established procedures concerning the need for adequate access/egress, and the design and use of Stairways and Ladders. You are accountable for ensuring that you understand by asking questions and seeking clarification during training and day-to-day practical job applications.

These policies have been developed to be as workable as possible while accomplishing our safety goals and complying with current OSHA regulations. You are welcome to suggest changes to these policies. All suggestions will be evaluated based upon their workability, impact on safety, and compliance with current OSHA regulations.

As one of Steingass Mechanical Contracting, Inc.'s employees, I have reviewed the latest copy of this procedure and have received training on the requirements on the following:

- A. The nature of fall hazards in the work area.
- B. The correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used.
- C. The proper construction, use, placement, and care in handling of all stairways and ladders.
- D. The maximum intended load carrying capacities of ladders used; and
- E. The Standards contained in this subpart.

**Employee Signature:** \_\_\_\_\_

**Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_

## **APPENDIX A**

This appendix serves as a guideline to assist employers in complying with ladder loading and strength requirements of 1926.1053(a)(1). A ladder designed in accordance with the applicable national consensus standards, as set forth below; will be considered to meet the requirements of 1926.1053(a)(1) and this procedure. **1926.1053 should be consulted for more definitive information.**

▪ **MANUFACTURED PORTABLE WOOD LADDERS:** American National Standards Institute (ANSI) A14.1-1982-American National Standard for Ladders-Portable Wood-Safety Requirements.

▪ **MANUFACTURED PORTABLE METAL LADDERS:** ANSI A14.2-1982-American National Standard for Ladders-Portable Metal Safety Requirements.

▪ **MANUFACTURED FIXED LADDERS:** ANSI A14.3-1984-American National Standard for Ladders-Fixed-Safety Requirements.

▪ **JOB-MADE LADDERS:** ANSI A14.4-1979-Safety Requirements for Job- Made Ladders.

▪ **PLASTIC LADDERS:** ANSI A14.5-1982-American National Standard for Ladders-Portable Reinforced Plastic-Safety Requirements.