



Don H. Mahaffey Drilling Co.

LADDER SAFETY



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1 OBJECTIVE

Don H. Mahaffey Drilling Co. has adopted and implemented this Ladder Safety program to establish the minimum requirements for the design, construction, selection, care, and use of all self-supporting and non-self-supporting portable ladders, in order to insure safety under normal conditions of usage.

2 PROGRAM ADMINISTRATOR

Don H. Mahaffey Drilling Co. has designated Ashley Mahaffey Tullius for the implementation and enforcement of the Ladder Safety program. Ashley Mahaffey Tullius is responsible for:

- a. Enforcing or designating management and supervisory team members for assistance in overseeing compliance and enforcement of the program; and
- b. Maintaining, reviewing and updating the program when necessary.

3 LADDER SAFETY, AN EXPLANATION OF

3.1 Introduction

Working on and around ladders is hazardous. Ladders are major sources of injuries and fatalities among construction workers for example, and many of the injuries are serious enough to require time off the job. Cal/OSHA regulations contained in this program apply to all ladders used in construction, alteration, repair, painting, decorating and demolition of worksites covered by Cal/OSHA's construction safety and health standards.

Each year, about 50 construction workers are killed by falls from ladders. More than half of the deaths occur to people working from ladders. Twice as many falls occur stepping down compared to going up ladders. The main cause of falls from straight and extension ladders is sliding of the ladder base. For self-supported ladders or stepladders, the main cause is tipping sideways. By complying with the safe practices and methods for selection, setup, use and inspection, workers can minimize their risk for injury associated with ladder use.

3.2 Hazards

Falls is a major hazard associated with ladders. Improper ladder setup and use can lead to falls, factors contributing to falls include haste/sudden movement, lack of attention, footwear, and user's physical condition. Additional ladder hazards are as follows:

- a. Broken or defective ladders;
- b. Ladders on slippery or uneven surfaces;
- c. Ladder rungs or shoes that have mud or grease on them;
- d. Carrying tools or materials up or down a ladder; and
- e. Electrical shock by using metal ladders near live electrical parts.

3.3 Hazard Prevention

Employees can prevent injury caused by hazards associated with ladders by applying the appropriate and necessary safe work practices, such as, but not limited to, the following:

- a. Using proper construction, use, placement, and care in handling of all stairways and ladders;
- b. Maintaining, inspecting and removing of damaged ladders from service;
- c. Using safe climbing and work safe practices on ladders, including user's position and points of contact methods;
- d. Using correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used, when necessary; and
- e. Observing the maximum intended load-carrying capacities of ladders.

4 GENERAL REQUIREMENTS

- 4.1 Except where either permanent or temporary stairways or suitable ramps or runways are provided, ladders described in this program will be used to give safe access to all elevations.
- 4.2 All portable ladders used in construction will comply with the provisions of California Code of Regulations, Title 8, Section 3276 and section 6 of this program.
- 4.3 All fixed ladders used in construction will comply with the provisions of California Code of Regulations, Title 8, Sections 3277 and 3278 and sections 7 and 8 of this program.
- 4.4 Single-rail ladders will not be used.

5 JOB-MADE LADDERS

5.1 General Requirements

Job-made ladders will be constructed for intended use. If a ladder is to provide the only means of access or exit from a working area for 25 or more employees, or simultaneous two-way traffic is expected, a double cleat ladder will be installed.

5.2 Job-Made Portable Ladders

Every portable ladder will be of such material, size, and construction that it will safely carry the load to be placed thereon. Ladders which are customarily used for special purposes, such as those used for access to and additional support for overhead platforms, ladder brackets, and ladder scaffolding, will be of such design, material, and construction that they will support all normal loads which may be imposed upon them.

5.3 Ladder Dimensions

- 5.3.1 Side rails, when of wood, will be the equivalent of dressed Douglas fir "selected lumber", free from sharp edges and splinters, and will not have knots, except for an occasional one less than 1/2-inch in diameter that appears only on the wide face and is at least 1/2-inch back from either edge.
- 5.3.2 Cleats of wood will be clear, straight-grained and absolutely free from knots of any size that appear in the narrow face. Knots appearing in the wide faces of cleats will not exceed a diameter of 1/4-inch. Cleats will be uniformly spaced within 1/4-inch tolerance, and not farther apart than 12 inches measured from the tops of cleats. The clear space in the plane of the cleats between the top of any cleat and an obstruction above will be at least 4 1/2 inches.
- 5.3.3 Double cleat ladders will not exceed 24 feet in length.
- 5.3.4 Single cleat ladders will not exceed 30 feet in length between supports (base and top landing). If ladders are to connect different landings, or if the length required exceeds this maximum length, two or more separate ladders will be used, offset with a platform between each ladder. Guardrails and toeboards will be erected on the exposed sides of the platforms.
- 5.3.5 The width of single cleat ladders will be at least 15 inches, but not more than 20 inches, between rails at the top.
- 5.3.6 Side rails will be parallel or flared top to bottom by not more than one-quarter of an inch for each 2 feet of length.
- 5.3.7 2-inch by 4-inch lumber will be used for side rails of single cleat ladders up to 16 feet long: 3-inch by 6-inch lumber will be used for single cleat ladders from 16 to 30 feet in length.
- 5.3.8 2-inch by 4-inch lumber will be used for side and middle rails of double cleat ladders up to 12 feet in length: 2-inch by 6-inch lumber for double cleat ladders from 12 to 24 feet in length.
- 5.3.9 Cleats will be inset into the edges of the side rails one-half inch, or filler blocks will be used on the rails between the cleats. The cleats will be secured to each rail with three 10d common wire nails or other fasteners of equivalent strength. Cleats will be uniformly spaced, 12 inches' top-to-top. Double-head nails will not be used for ladder construction.

6 PORTABLE LADDERS

6.1 Design and Construction

- 6.1.1 Portable wood ladders placed in service after January 7, 2011 will meet the design and construction requirements of ANSI A14.1-2007, American National Standard for Ladders - Wood Safety Requirements, which is hereby

incorporated by reference. Portable wood ladders placed in service on or before January 7, 2011, will meet the design and construction requirements of the ANSI A14.1 standard in effect at the time such ladders were placed in service.

EXCEPTION: Portable job-made cleat ladders that are designed and constructed in accordance with the requirements of Section 1676 of the Construction Safety Orders.

- 6.1.2 Portable metal ladders placed in service after January 7, 2011, will meet the design and construction requirements of ANSI A14.2-2007, American National Standard for Ladders - Portable Metal - Safety Requirements, which is hereby incorporated by reference. Portable metal ladders placed in service on or before January 7, 2011, will meet the design and construction requirements of either the ANSI A14.2 standard or the ANSI A14.10 standard, American National Standard for Ladders - Portable Special Duty Ladders, in effect at the time such ladders were placed in service.
- 6.1.3 Portable reinforced plastic ladders placed in service after January 7, 2011, will meet the design and construction requirements of ANSI A14.5-2007, American National Standard for Ladders - Portable Reinforced Plastic - Safety Requirements, which is hereby incorporated by reference. Portable reinforced plastic ladders placed in service on or before January 7, 2011, will meet the design and construction requirements of either the ANSI A14.5 standard or the ANSI A14.10 standard in effect at the time such ladders were placed in service.
- 6.1.4 Portable special purpose ladders that are not covered by one of the ANSI A14 standards referenced in this section will be designed and constructed in accordance with sound engineering principles and approved per California Code of Regulations, Title 8, Section 3206.
- 6.1.5 Ladder type step stools will be designed and constructed such that the rungs, cleats, and steps are not less than 8 inches apart, or more than 12 inches apart, as measured between center lines of the rungs, cleats, and steps.

6.2 Selection

- 6.2.1 Ladders will be selected and their use restricted to the purpose for which the ladder is designed. Single-rail ladders will not be used.
 - a. Scaffolds or other worker positioning equipment will be used when work cannot be safely done from ladders.
 - b. Portable ladders are generally designed for one-person use to meet the requirements of the person, the task, and the environment. When selecting a ladder for use, consideration will be given to the ladder length or height required, the working load, the duty rating, worker position to the task to be performed, and the frequency of use to which the ladder will be subjected.

6.2.2 Ladders will be used according to the following duty classifications:

Duty Rating	Ladder Type	Working Load (Pounds)
Special Duty	IAA	375
Extra Heavy-Duty	IA	300
Heavy-Duty	I	250
Medium-Duty	II	225
Light-Duty	III	200

6.2.3 Ladders used in connection with ladder jack scaffolds will be Type I, IA, or IAA duty rated ladders and will be installed and used in accordance with California Code of Regulations, Title 8, Section 1648.

6.2.4 Ladders used in connection with outdoor advertising structures will be Type I, IA, or IAA duty rated and will be used in accordance with California Code of Regulations, Title, Section 3413.

6.3 Care, Use, Inspection and Maintenance of Ladders.

6.3.1 Maintenance

Ladders will be maintained in good condition at all times, the joint between the steps and side rails will be tight, all hardware and fittings securely attached, and the movable parts will operate freely without binding or undue play. Metal ladders will not be exposed to acid or alkali materials that are capable of corroding the ladder and reducing the ladder's strength, unless the employer obtains and follows the recommendations of the ladder manufacturer or a qualified person regarding exposure to corrosive materials.

6.3.2 Inspection

Ladders will be inspected by a qualified person for visible defects frequently and after any occurrence that could affect their safe use.

6.3.3 Damaged Ladders

Ladders that have developed defects will be withdrawn from service for repair or destruction; and tagged or marked as "Dangerous, Do Not Use" or with similar language. Ladders with broken or missing steps, rungs, cleats, safety feet, side rails, or other defects will not be used.

6.3.4 Cleaning

Ladders will be free of oil, grease, or slippery materials.

6.3.5 Surface Coatings.

Wood ladders will not be painted with other than a transparent material.

6.3.6 The area around the top and bottom of a ladder will be kept clear.

6.4 Loading and Support

6.4.1 Loading

Portable ladders will not be overloaded when used.

6.4.2 Footing Support

The ladder base section of surface supported ladders will be placed on a secure and level footing. When necessary, ladder levelers will be used to achieve equal rail support on uneven surfaces. Ladders will not be placed on boxes, barrels or other unstable bases to obtain additional height. Ladders will not be used on ice, snow or slippery surfaces unless suitable means to prevent slippage have been employed.

6.4.3 Top Support

- a. The top of non-self-supporting ladders such as single and extension ladders will be placed with the two rails supported equally, unless a single support attachment is provided and used.
- b. The top rest for portable rung and cleat ladders will be reasonably rigid and will have ample strength to support the applied load.

6.5 Angle of Inclination

Non-self-supporting ladders such as single ladders and extension ladders will, where possible, be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is one-quarter of the working length of the ladder (the length along the ladder between the foot and the top support). The ladder will be so placed as to prevent slipping, or it will be tied, blocked, held, or otherwise secured to prevent slipping. Ladders will not be used in a horizontal position as platforms, runways, or scaffolds unless designed for such use.

6.6 Access

6.6.1 Access to Elevated Work Areas

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 will be offset with a platform or landing between the ladders.

6.6.2 Access to Landings

When portable ladders are used for access to an upper landing surface, the side rails will extend not less than 36 inches above the upper landing surface to which the ladder is used to gain access; or when such an extension is not possible, then the ladder will be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grab-rail, will be provided to assist employees in mounting and dismounting the ladder. In no case will the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

6.7 Climbing and Working on Ladders

Employees will:

- a. Climb or work with the body near the middle of the step or rung and will not overreach from this position. When necessary to avoid overreaching, the employee will descend and reposition the ladder. When it is not practical to work with the body near the middle of the step or rung, the ladder will be secured to the top support, and is protected by a personal fall protection system.
- b. Be prohibited from carrying equipment or materials which prevent the safe use of ladders.
- c. Face the ladder when ascending or descending and maintain contact with the ladder at three-points at all times.
- d. Not be permitted to stand and work on the top 3 rungs of a single or extension ladder unless there are members of the structure that provide a firm handhold or is protected by a personal fall protection.
- e. Not sit, kneel, step or stand on the pail shelf, topcap or the step below the topcap of a step ladder.
- f. Not use the cross-bracing on the rear section of step ladders for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- g. Not move, shift, or extend ladders while occupied, unless the ladder is designed and recommended for this purpose by the manufacturer.

6.8 Prohibited Uses

- 6.8.1 Ladders will not be used as a brace, skid, guy or gin pole, gang-way, or for other uses than that for which they were intended, unless specifically recommended for use by the manufacturer.
- 6.8.2 Planks will not be used on the top step or topcap of step ladders.
- 6.8.3 Step ladders will not be used as single ladders or in the partially closed position.
- 6.8.4 Ladders that exceed the following maximum lengths will not be used:

Ladder Type	Maximum Length (Feet)
Step ladder	20
Two-section extension ladder (wood)	60
Two-section extension ladder (metal)	48
Three-section extension ladder (metal)	60
Two-section extension ladder (reinforced plastic)	72
Trestle ladder	20
Extension trestle ladder base section	20

Extension trestle ladder extension section	20
Painter's step ladder	12
Mason's ladder	40
Cleat ladder	30
Trolley ladder or side-rolling ladder	20
Single ladder	30

6.8.5 Two section extension ladders will not be used when the overlap between the sections is less than the following minimum overlap:

Ladder Size (Feet)	Minimum Overlap (Inches)
Up to and including 32	36
Over 32, up to and including 36	46
Over 36, up to and including 48	58
Over 48, up to and including 60	70

6.9 Additional Information

6.9.1 Portable rung ladders with reinforced rails will be used only with the metal reinforcement on the underside.

6.9.2 Electrical Hazards

Non-conductive ladders will be used in locations where the ladder or user may contact unprotected energized electrical conductors or equipment. Conductive ladders will be legibly marked with signs reading "CAUTION - Do Not Use Around Electrical Equipment," or equivalent wording.

6.9.3 Fastening Together

Ladders will not be tied or fastened together to provide longer sections unless the ladders are designed for such use and equipped with the necessary hardware fittings.

6.9.4 Erection of Extension Ladders

Extension ladders will always be erected so that the top section (fly section) is above and resting on the bottom section (base section) with the rung locks engaged.

6.9.5 Ladder Placement

Ladders will not be placed in passageways, doorways, driveways, or any location where they may be displaced by activities being conducted on any other work, unless protected by barricades or guards.

7 FIXED LADDERS

7.1 General Requirement

All fixed ladders will be approved as defined in California Code of Regulations, Title 8, Section 3206.

7.2 Design Considerations

All ladders, appurtenances, and fastenings will be designed to meet the following load requirements:

- a. The minimum design live load will be a single concentrated load of 200 pounds.
- b. The number and position of additional concentrated live-load units of 200 pounds each as determined from anticipated usage of the ladder will be considered in the design.
- c. The live loads imposed by persons occupying the ladder will be considered to be concentrated at such point or points as will cause the maximum stress in the structural member being considered.
- d. The weight of the ladder and attached appurtenances together with the live load will be considered in the design of rails and fastenings.
- e. All wood parts of fixed ladders will meet the design and construction requirements for portable wood ladders in California Code of Regulations, Title 8, Section 3276(c).
- f. For fixed ladders consisting of wood side rails and wood rungs or cleats, used at a pitch in the range 75 degrees to 90 degrees, and intended for use by no more than one person per section, single ladders or cleat ladders as described in California Code of Regulations, Title 8, Section 3276 are acceptable.

7.3 Specific Features

- 7.3.1 All rungs will have a minimum diameter of 3/4 inch for metal ladders, except as covered in section 7.4.1 of this program and a minimum diameter of 1 1/8 inches for wood ladders. Materials other than steel, aluminum, and wood are acceptable provided the design, fabrication, and erection are in accordance with recognized design practice and meet the design requirements of sections 7.2 and 7.3 of this program, when applicable.
- 7.3.2 The distance between the top surfaces of rungs, cleats, and steps will not exceed 12 inches and will be uniform throughout the length of the ladder.
- 7.3.3 The minimum clear length of rungs or cleats will be 16 inches.
- 7.3.4 Rungs, cleats, and steps will be free of splinters, sharp edges, burrs, or projections which may be a hazard.
- 7.3.5 The rungs of an individual-rung ladder will be so designed that the climber's foot cannot slide off the end of a rung. A suggested design for metal rungs is shown in Fig. 4 in Appendix 2.

- 7.3.6 Side Rails. Side rails which might be used as a climbing aid will be of such cross sections as to afford adequate gripping surface without sharp edges, splinters, or burrs.
- 7.3.7 Fastenings. Fastenings will be an integral part of fixed ladder design.
- 7.3.8 Splices
All splices made by whatever means will meet design requirements as noted in 7.2. All splices and connections will have smooth transition with original members and with no sharp or extensive projections.
- 7.3.9 Electrolytic Action
Adequate means will be employed to protect dissimilar metals from electrolytic action when such metals are joined.
- 7.3.10 Welding
All welding will be in accordance with procedures of the American Welding Society, or equivalent.
- 7.3.11 Embedment
Individual rungs of ladders installed in manholes and underground vaults having a wall thickness which will not permit at least 6 inches of embedment will have anchoring devices that will provide the minimum design load requirements of section 7.2 in addition to the following requirements:
- a. The minimum design live load will be a single concentrated load of 300 pounds.
 - b. Steps or rungs will be embedded in the wall a minimum distance of 3 inches.

7.4 Protection from Deterioration

- 7.4.1 Metal
Metal ladders and appurtenances will be painted or otherwise treated to resist corrosion and rusting when location demands. Ladders formed by individual metal rungs imbedded in concrete, which serve as access to pits and to other areas under floors, are frequently located in an atmosphere that causes corrosion and rusting. To increase rung life in such atmosphere, individual metal rungs will have a minimum diameter of 1 inch or will be painted or otherwise treated to resist corrosion and rusting.
- 7.4.2 Wood
Wood ladders, when used under conditions where decay may occur, will be treated with a nonirritating preservative, and the details will be such as to prevent or minimize the accumulation of water on wood parts. Wood ladders will not be painted but may be coated with a clear sealant after inspection has assured that all requirements of section 8 have been met.

Note: Paint does and will not act as a wood preservative.

7.4.3 Combined Materials

When different types of materials are used in the construction of a ladder, the materials used will be so treated as to have no deleterious effect, one upon the other.

7.5 Clearance

- 7.5.1 On fixed ladders, the perpendicular distance from the center line of the rungs to the nearest permanent object on the climbing side of the ladder will be 36 inches for a pitch of 76 degrees, and 30 inches for a pitch of 90 degrees (Fig. 5 in Appendix 2), with minimum clearances for intermediate pitches varying between these two limits in proportion to the slope, except as provided in 7.5.3 and 7.5.7.
- 7.5.2 A clear width of at least 15 inches will be provided each way from the center line of the ladder in the climbing space, except when cages or wells are necessary. (See 7.6.2 and Fig. 5 in Appendix 2.)
- 7.5.3 Ladders equipped with cage or basket will be excepted from the provisions of 7.5.1 and 7.5.2, but will conform to the provisions of 7.6.5. Fixed ladders in smooth-walled wells will be excepted from the provisions of 7.5.1, but will conform to the provisions of 7.6.6.
- 7.5.4 The distance from the center line of rungs, cleats, or steps to the nearest permanent object in back of the ladder will be not less than 7 inches (Fig. 5 in Appendix 2), except that when unavoidable obstructions are encountered, minimum clearances as shown in Fig. 6 in Appendix 2 will be provided.
- 7.5.5 The distance from the center line of the grab bar to the nearest permanent object in back of the grab bars will be not less than 4 inches. Grab bars will not protrude on the climbing side beyond the rungs of the ladder which they serve.
- 7.5.6 The step-across distance from the nearest edge of ladder to the nearest edge of equipment or structure will be not more than 12 inches, or less than 2 1/2 inches (Fig. 7 in Appendix 2).
- 7.5.7 All hatch covers will open a minimum of 60 degrees from the horizontal. The distance from the center line of rungs or cleats to the edge of the hatch opening on the climbing side will be not less than 24 inches for offset wells or 30 inches for straight wells. There will be no protruding potential hazards within 24 inches of the center line of rungs or cleats; any such hazards within 30 inches of the center line of the rungs or cleats will be fitted with deflector plates placed at an angle of 60 degrees from the horizontal as indicated in Fig. 8 in Appendix 2. The relationship of a fixed ladder to an acceptable hatch cover is illustrated in Fig. 9 in Appendix 2.

7.6 Cages or Wells

7.6.1 Construction

Cages or wells will be built as shown on the applicable drawings, covered in detail in Figs. 1, 10, and 11 in Appendix 2, or of equivalent construction.

7.6.2 Dimensions and Maximum Length

Cages or wells conforming to the dimensions shown in Figs. 1, 10, and 11 in Appendix 2 will be provided on ladders of more than 20 feet to a maximum unbroken length of 30 feet.

7.6.3 Top of Cage

Cages will extend a minimum of 42 inches above the top of landing, unless other acceptable protection is provided.

7.6.4 Bottom of Cage

Cages will extend down the ladder to a point not less than 7 feet nor more than 8 feet above the base of the ladder, with the bottom flared not less than 4 inches. When the ladder terminates on a landing platform or walkway at an elevation greater than 30 inches above the ground, a ladder cage extension will be provided from the bottom of the cage to the top of the guardrail when the distance from the plane of the ladder rungs to the guardrail is equal to or less than that shown in Figure 11 in Appendix 2, "Ladder Cages at Elevated Locations."

- a. When the guardrail is located at a distance greater than that shown in Figure 11, a ladder cage extension need not be provided.
- b. The ladder cage extension or equivalent will be constructed as follows:
 1. The ladder cage extension or equivalent will be capable of withstanding a force of at least 200 pounds applied horizontally at any point.
 2. The ladder cage extension or equivalent will be of solid construction, grille work with vertical bars located at a maximum spacing of 9-1/2 inches, center-to-center, or of slat-work with openings between slats not more than 4 vertical inches.
 3. The ladder cage extension or equivalent will be free of hazardous projections.
 4. The ladder cage extension or equivalent will be provided not less than two feet each side of the ladder center line where there is an exposure.
 5. Vertical guardrail extensions may be used as equivalent construction for the ladder cage extension provided they are as high as the bottom of the cage opening and they comply with the provisions of 7.6.4 (b).

7.6.5 Size of Cage

Cages will not extend less than 27 nor more than 30 inches from the center line of the rungs of the ladder. The cage will not be less than 27 inches in width. The inside will be clear of projections. Vertical bars will be located at a maximum spacing of 9-1/2 inches, center-to-center around the circumference.

7.6.6 Ladder Wells

Ladder wells will have a clear width of at least 15 inches measured each way from the center line of the ladder. (See Fig.1 in Appendix 2) Smooth-walled wells will be a minimum of 27 inches and a maximum of 30 inches from the center line of rungs to the well wall on the climbing side of the ladder. Where other obstructions on the climbing side of the ladder exist, there will be a minimum of 30 inches from the center line of the rungs.

7.7 Pitch

7.7.1 Preferred Pitch

The preferred pitch of fixed ladders will be considered to come in the range of 75 to 90 degrees with the horizontal. (See Fig. 12 in Appendix 2)

7.7.2 Substandard Pitch

Fixed ladders will be considered as substandard if they are installed within the substandard pitch range of 60 to 75 degrees with the horizontal. Substandard fixed ladders will be permitted only where it is found necessary to meet conditions of installation. (See Fig. 12 in Appendix 2) This substandard pitch range will be considered as a critical range to be avoided, if possible.

7.7.3 Scope of Coverage in This Program

This program covers only fixed ladders within the pitch range of 60 to 90 degrees with the horizontal. (See Fig. 12 in Appendix 2)

7.7.4 Pitch Greater Than 90 Degrees

Ladders having a pitch in excess of 90 degrees with the horizontal will not be permitted.

7.8 Maintenance

All ladders will be maintained in a safe condition. All ladders will be inspected regularly, with the intervals between inspections being determined by use and exposure.

7.9 Landing Platforms

7.9.1 When ladders are used to ascend to heights exceeding 20 feet, landing platforms will be provided as follows:

- a. Where no cage, well, or ladder safety system is provided, landing platforms will be provided for each 20 feet of height or fraction thereof.
- b. Where a cage or well is provided and no ladder safety system is provided, landing platforms will be provided for each 30 feet of height or fraction thereof.
- c. Each ladder section will be offset from adjacent ladder sections at each landing.
- d. Where installation conditions (even for a short, unbroken length) require that adjacent sections be offset, landing platforms will be provided at each offset (See section 7.10.3).

- 7.9.2 Where an employee has to step a distance greater than 12 inches from the center line of the rung of a ladder to the nearest edge of structure or equipment, a landing platform will be provided. The minimum step-across distance will be 2 1/2 inches (Figure 7 in Appendix 2).
- 7.9.3 All landing platforms will be equipped with guardrails and toeboards, so arranged as to give safe access to the ladder. Platforms will be not less than 24 inches in width and 30 inches in length.
- 7.9.4 One rung of any section of ladder will be located at the level of the landing laterally served by the ladder. Where access to the landing is through the ladder, the same rung spacing as used on the ladder will be used from the landing platform to the first rung below the landing (Figure 10 in Appendix 2).

7.10 Additional Information

7.10.1 Ladder Extensions

The side rails of through or side-step ladder extensions will extend 3 1/2 feet above parapets and landings. For through ladder extensions, the rungs will be omitted from the extension and will have not less than 18 nor more than 24 inches clearance between rails (Figure 2 in Appendix 2). For side-step or offset fixed ladder sections, at landings, the side rails and rungs will be carried to the next regular rung beyond or above the 3 1/2 feet minimum (Figure 3 in Appendix 2).

7.10.2 Grab Bars

Grab bars will be spaced by a continuation of the rung spacing when they are located in the horizontal position. Vertical grab bars will have the same spacing as the ladder side rails. Grab bar diameters will be the equivalent of the round-rung diameters.

7.10.3 Ladder Safety Systems

Ladder safety systems may be used on tower, water tank, and chimney ladders over 20 feet in unbroken length in lieu of cage protection. No landing platform will be required in these cases. All ladder safety systems will meet the design requirements of the ladders which they serve [See section 7.2].

8 EMPLOYEE USE OF FIXED LADDERS

Employees will:

- a. Be prohibited from carrying equipment or materials which prevent the safe use of ladders;
- b. Be required to face the ladder when ascending and descending;
- c. Always use both hands when climbing up or down the ladder; and
- d. Be prohibited from using single-rail ladders.

9 PORTABLE LADDER TRAINING

9.1 Employee Training

Before an employee uses a ladder, the employee will be provided training in the safe use of ladders, unless it is demonstrated that the employee is already trained in ladder safety.

9.2 Supervisor Training

Supervisors of employees who routinely use ladders will also be provided ladder safety training, unless it is demonstrated that the supervisor is already trained in ladder safety as required by this subsection.

9.3 Training Content

The training will address the following topics, unless it is demonstrated a topic is not applicable to the safe use of ladders in the workplace:

- a. Importance of using ladders safely, including: frequency and severity of injuries related to falls from ladders.
- b. Selection, including: types of ladders, proper length, maximum working loads, and electrical hazards.
- c. Maintenance, inspection, and removal of damaged ladders from service.
- d. Erecting ladders, including: footing support, top support, securing, and angle of inclination.
- e. Climbing and working on ladders, including: user's position and points of contact with the ladder.
- f. Factors contributing to falls, including: haste, sudden movement, lack of attention, footwear, and user's physical condition.
- g. Prohibited uses, including: uses other than designed, climbing on cross bracing, maximum lengths, and minimum overlap of extension ladder sections.

APPENDIX 1 – DEFINITIONS

Cage – A cage is a guard that may be referred to as a cage or basket guard, which is an enclosure that is fastened to the side rails of the fixed ladder or to the structure to encircle the climbing space of the ladder for the safety of the person who must climb the ladder.

Carrier – The track of a ladder safety system consisting of a flexible cable or rigid rail, which is secured to the ladder or structure by mountings.

Cleats – Cleats are ladder crosspieces of rectangular cross section placed on edge on which a person may step in ascending or descending.

Extension Ladder – An extension ladder is a non-self-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets so arranged as to permit length adjustment. Its size is designated by the sum of the lengths of the sections measured along the side rails.

Extension Trestle Ladder – An extension trestle ladder is a self-supporting portable ladder, adjustable in length, consisting of a trestle ladder base and a vertically adjustable single ladder, with suitable means for locking the ladders together. The size is designated by the length of the trestle ladder base.

Fastenings – A fastening is a device to attach a ladder to a structure, building, or equipment. Fixed, hinged, bearing, or slide-type fastenings may be used.

Fixed Ladder – A fixed ladder is a ladder permanently attached to a structure, building, or equipment. Ladders referred to in this code will be construed to be fixed ladders.

Grab Bars – Grab bars are individual handholds placed adjacent to or as an extension above ladders for the purpose of providing access beyond the limits of the ladder.

Individual-Rung Ladder – An individual-rung ladder is a fixed ladder each rung of which is individually attached to a structure, building, or equipment.

Ladders – A ladder is an appliance usually consisting of two side rails joined at regular intervals by crosspieces called steps, rungs, or cleats, on which a person may step in ascending or descending.

Ladder Safety System – An approved assembly of components whose function is to arrest the fall of a user. The ladder safety system will include the carrier and its associated attachment elements (brackets, fasteners, etc.), safety sleeve, full body harness and connectors, wherein the carrier is permanently attached to the climbing face of the ladder or immediately adjacent to the structure.

Sectional Ladder – A sectional ladder is a non-self-supporting portable ladder, nonadjustable in length, consisting of two or more sections of ladder so constructed that the sections may be combined to function as a single ladder. Its size is designated by the overall length of the assembled sections.

Pitch – Pitch is the included angle between the horizontal and the ladder, measured on the opposite side of the ladder from the climbing side.

Rail Ladder – A rail ladder is a fixed ladder consisting of side rails joined at regular intervals by rungs or cleats and fastened in full length or in sections to a building, structure, or equipment.

Railings – Railings when referred to in this section will be any one or a combination of those railings defined in §3210.

Rungs – Rungs are ladder crosspieces on which a person may step in ascending or descending.

Safety Sleeve – The part of a ladder safety system consisting of the moving component with locking mechanism that travels on the carrier and makes the connection between the carrier and the full body harness.

Side-Rolling Ladder – A side-rolling ladder is a semifixed ladder, nonadjustable in length, supported by attachments to a guide rail, which is generally fastened to shelving, the plane of the ladder being also its plane of motion.

Side-Step Ladder – A side-step ladder is one from which a person getting off at the top must step sideways from the ladder in order to reach the landing, such as shown in Fig. 3 in Appendix 2.

Single Ladder – A single ladder is a non-self-supporting portable ladder, nonadjustable in length, consisting of but one section. Its size is designated by the overall length of the side rail.

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

Special-Purpose Ladder – A special-purpose ladder is a portable ladder which represents either a modification or a combination of design or construction features in one of the general-purpose types of ladders previously defined, in order to adapt the ladder to special or specific uses.

Steps – Steps are the flat crosspieces of a ladder on which a person may step in ascending or descending.

Step Ladder – A step ladder is a self-supporting portable ladder, nonadjustable in length, having flat steps and a hinged back. Its size is designated by the overall length of the ladder measured along the front edge of the side rails.

Step stool (ladder type) – A self-supporting, foldable, portable ladder, nonadjustable in length, 32 inches or less in length, with flat steps and without a pail shelf, designed so that the ladder top cap as well as all steps can be climbed on. The side rails may extend above the top-cap but such extension is not considered as part of the step stool length.

Through Ladder – A through ladder is one from which a person getting off at the top must step through the ladder in order to reach the landing, such as shown in Fig. 2 in Appendix 2.

Trestle Ladder – A trestle ladder is a self-supporting portable ladder, nonadjustable in length, consisting of two sections hinged at the top to form equal angles with the base. The size is designated by the length of the side rails measured along the front edge.

Trolley Ladder – A trolley ladder is a semifixed ladder, nonadjustable in length, supported by attachments to an overhead track, the plane of the ladder being at right angles to the plane of motion.

Well – A well is a permanent complete enclosure around a fixed ladder, which is attached to the walls of the well. Proper clearances for a well will give the person who must climb the ladder the same protection as a cage. (See 7.6.6 and Fig. 1 in Appendix 2).

APPENDIX 2 – FIXED LADDER DIAGRAMS AND FIGURES

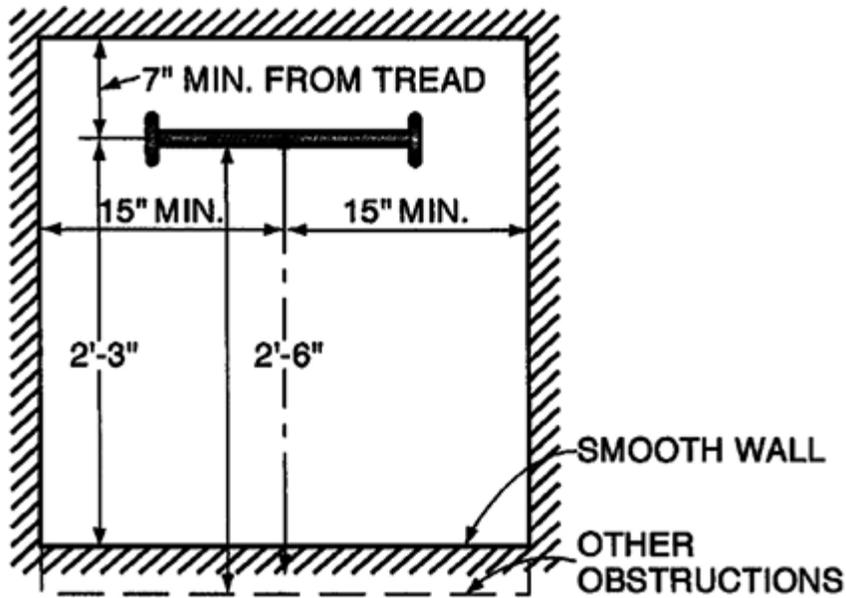
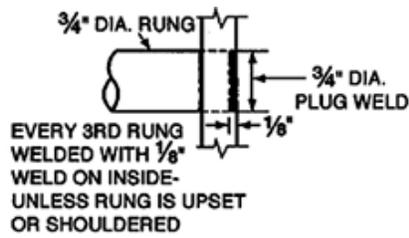


Figure 1



Section A-A

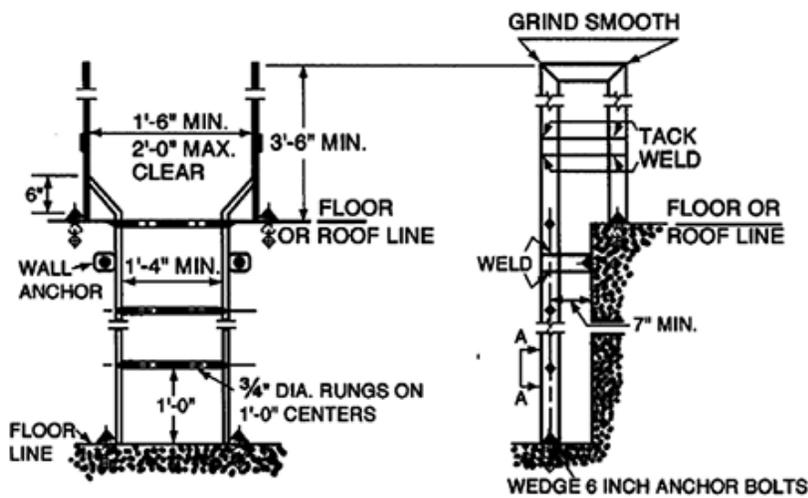


Figure 2

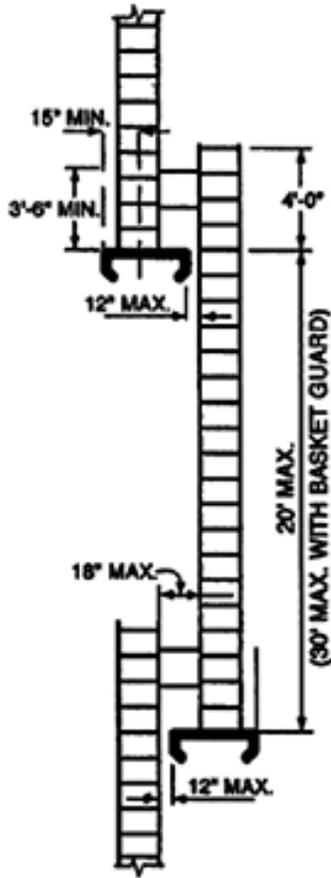


Fig. 3
Offset Fixed Ladder Sections

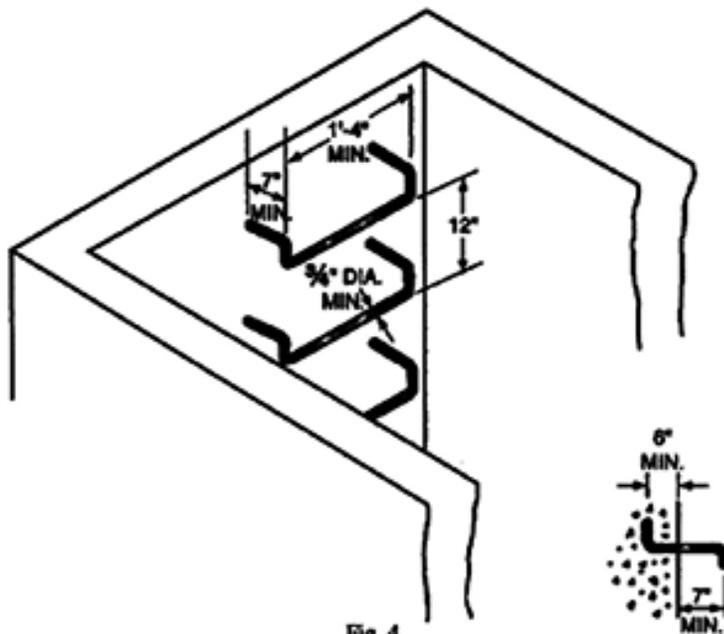
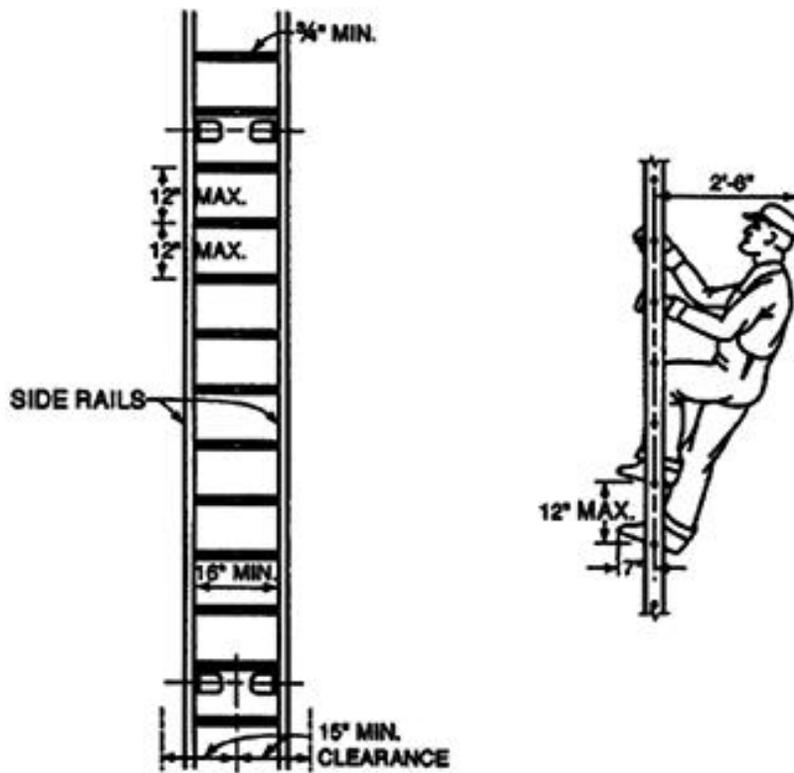


Fig. 4
Suggested Design for Rungs on Individual-Rung Ladders



RAIL LADDER WITH BAR STEEL RAILS
AND ROUND STEEL RUNGS

Fig. 5
Minimum Ladder Clearance

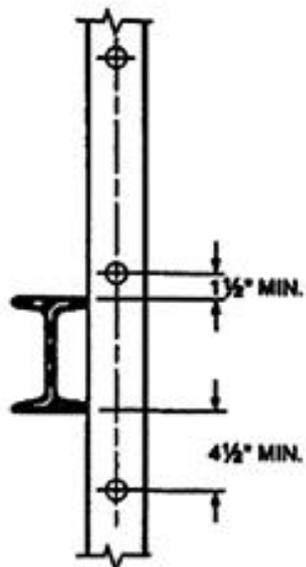


Fig. 6
Clearance for Unavoidable Obstruction

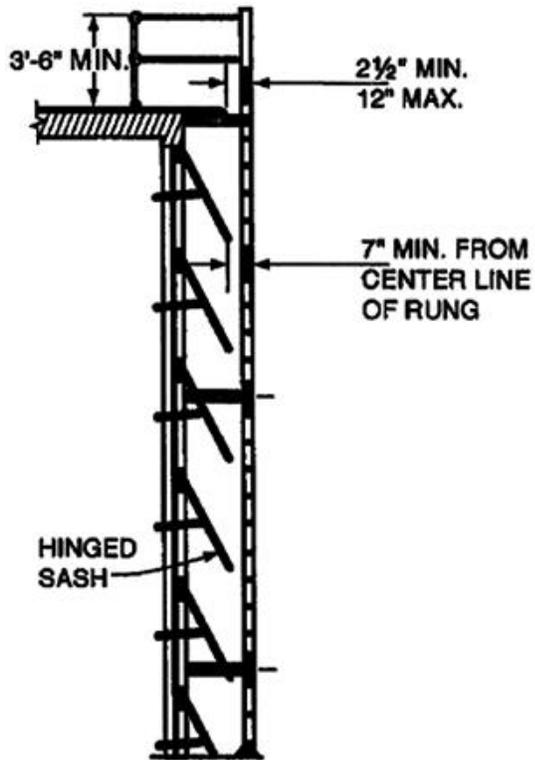


Fig. 7
Ladder Far from Wall

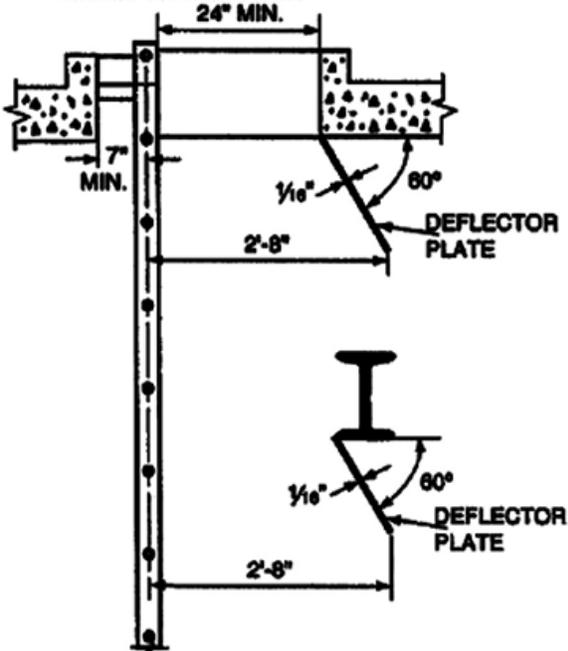


Fig. 8
Deflector Plates for Head Hazards

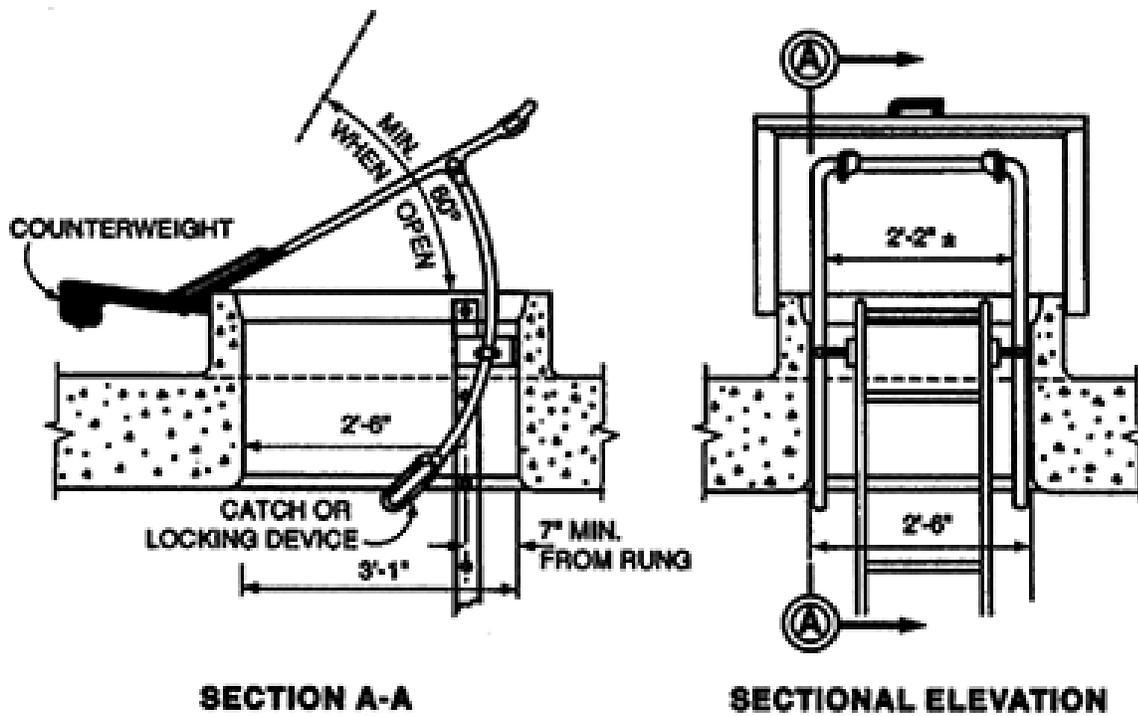


Fig. 9
 Relationship of Fixed Ladder to a Safe Access Hatch

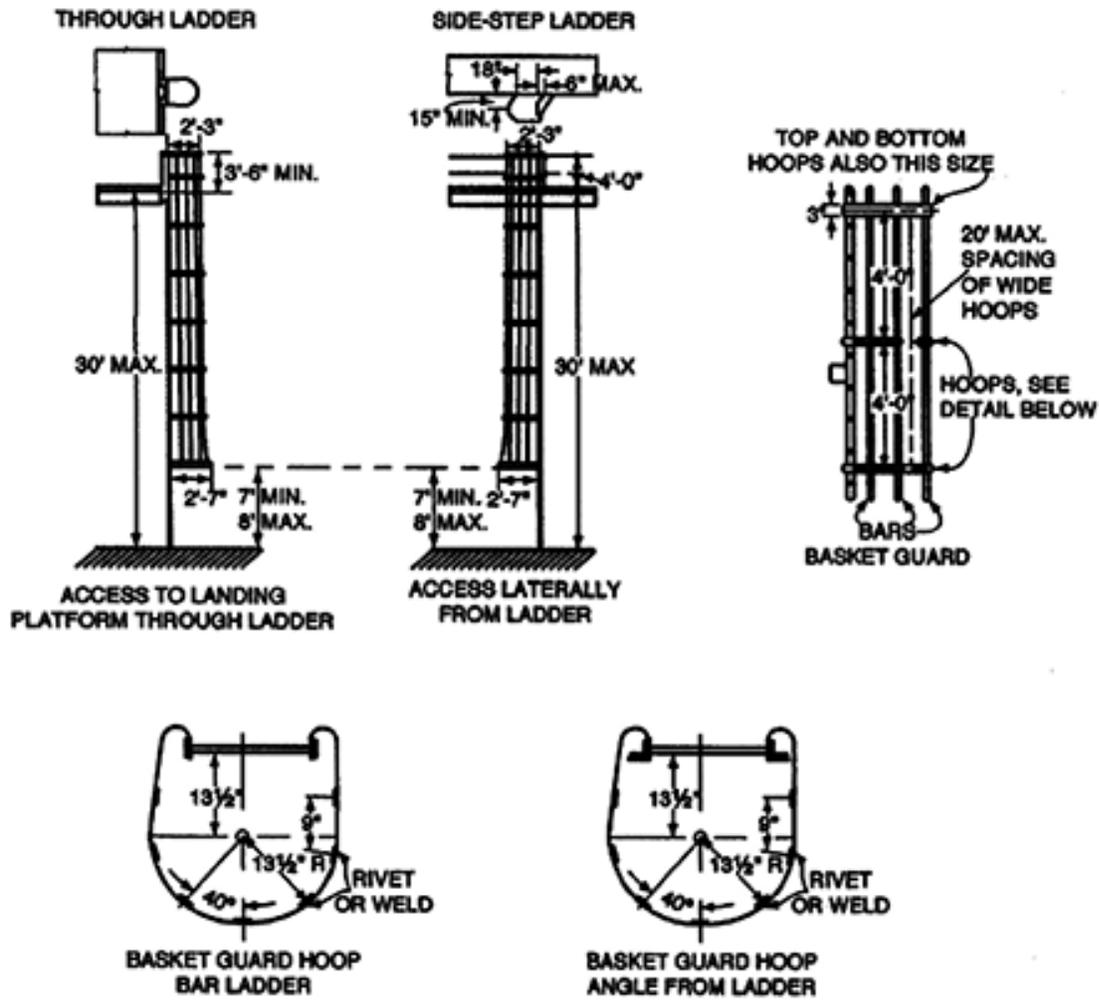


Fig. 10
Cages for Ladders More Than 20 Feet High

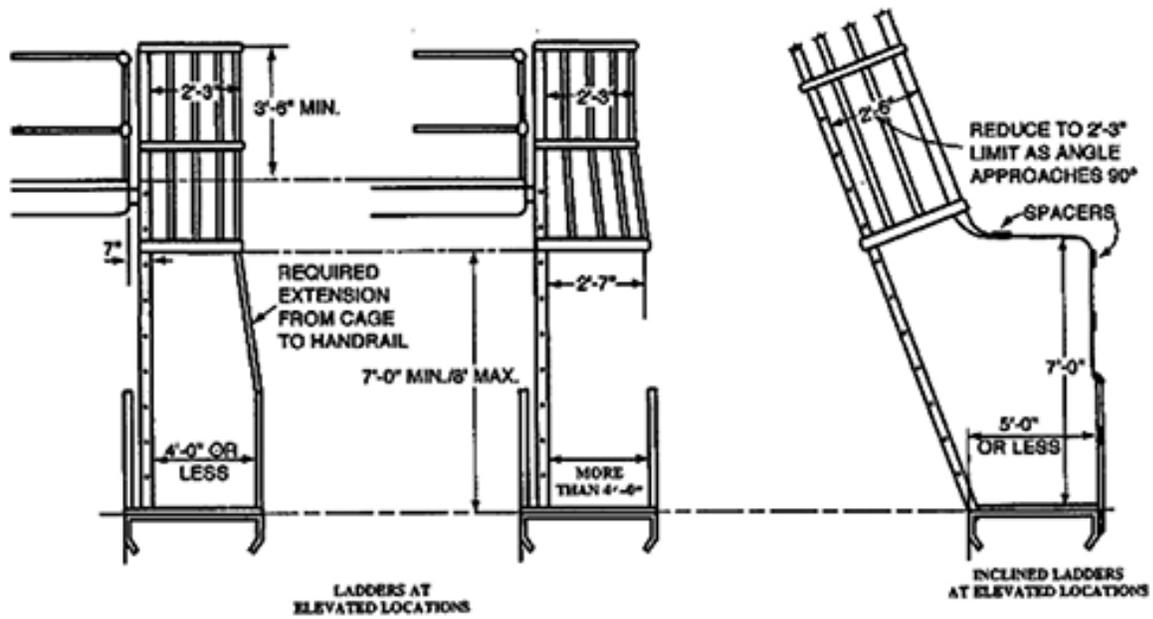


Fig. 11
Ladder Cages at Elevated Locations

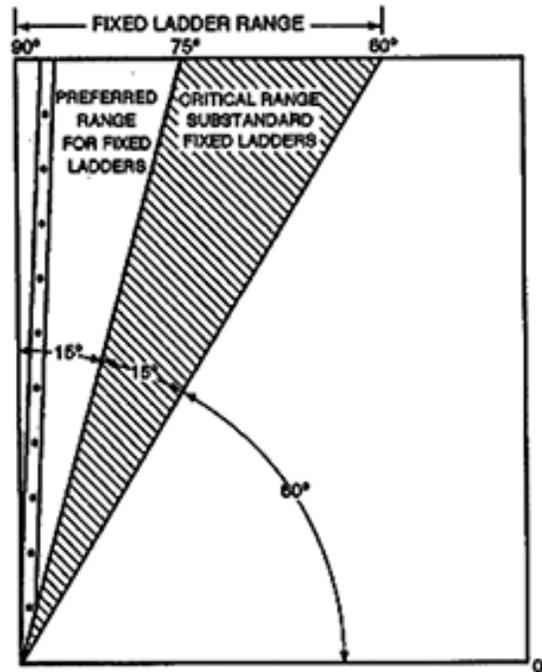


Fig. 12
Pitch of Fixed Ladders

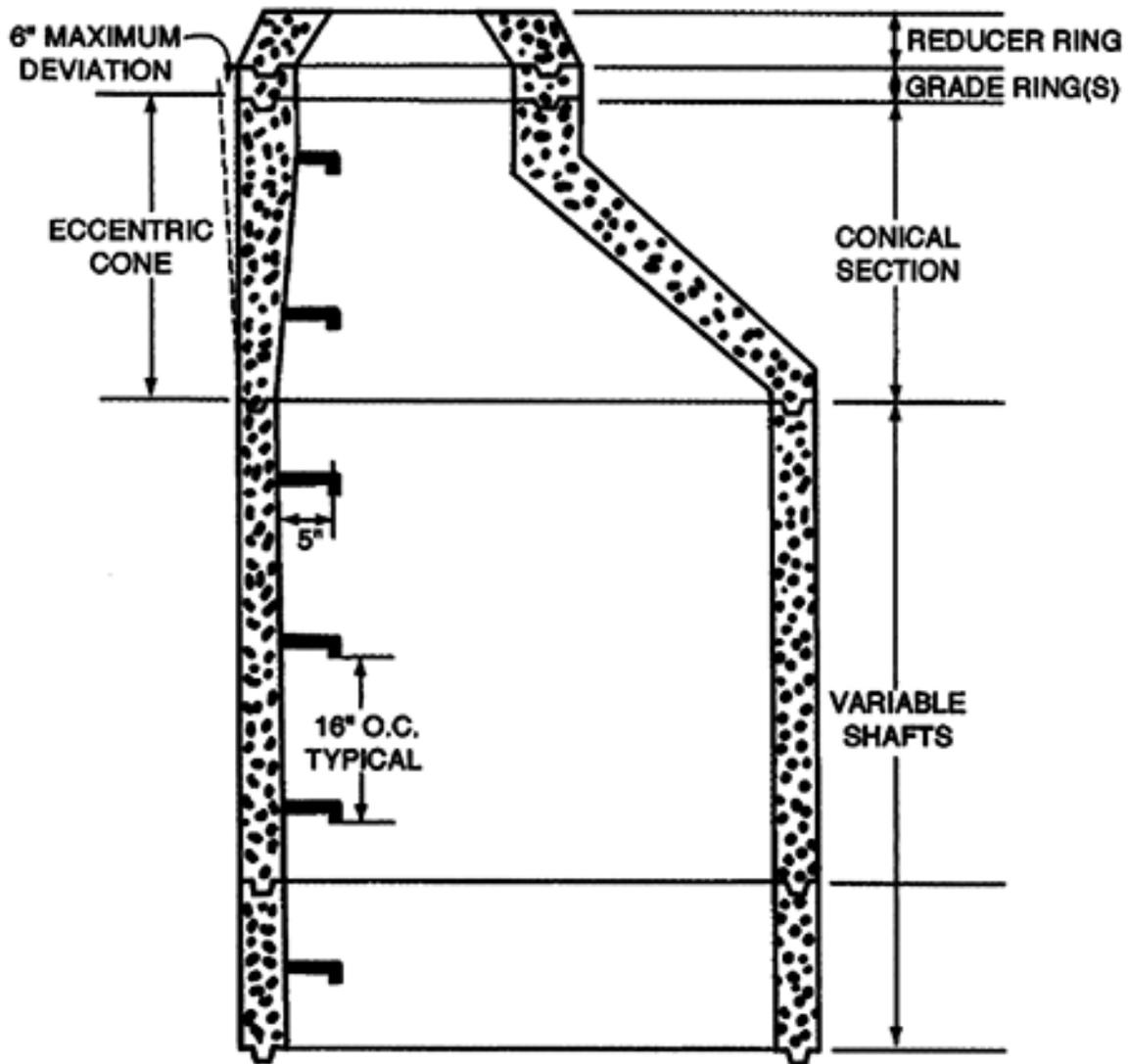


Fig. 13
Manholes and Underground Vaults