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Chapter 8.7 Ladders, Scaffolds, and Elevated Platforms: How to Work with Them Safely

This could be you . . .

A worker was seriously injured when he fell about 20 feet from a ladder. He was the only person in a remote facility, and no one knew he was there inspecting some pipes. He walked the ladder along the elevated piping to see additional sections and caused the ladder to fall. He had to crawl to a nearby area to get help.

Two workers miraculously survived but were permanently injured when the suspended scaffolding they had improperly set up fell approximately 40 feet with them on it. They had the manufacturer's instruction and operation manual, but failed to read or apply it in the setup. They weren't experienced with suspended scaffolding, but had been given the task to assemble and use it.

8.7.1 Applicability of this chapter

8.7.1.1 You are required to follow this chapter if you are a JSC civil service, contractor, or subcontractor employee who constructs, maintains, or uses:

- a. Ladders
- b. Scaffolds
- c. Safety nets
- d. Elevated platforms

8.7.2 What this chapter covers

This chapter covers the minimum requirements for constructing, erecting, testing, assembling, using, disassembling, lowering, maintaining, or storing ladders, scaffolds, safety nets, or elevated platforms. It also covers fall protection for working on ladders, scaffolds, and elevated platforms as required in Chapter 8.8.

8.7.3 Fall Protection

Employees shall follow chapter 8.8 for fall protection related to any work covered by this chapter. Fall protection is required to protect workers from fall hazards along unprotected sides or edges that are at least 4 feet above a lower level. In general industry, this applies to any condition on a walking-working surface that exposes an employee to a risk of harm from fall on the same level or to a lower level.

8.7.4 Requirements for using portable ladders

8.7.4.1 Portable ladders are a means of getting from one work level to another. They aren't designed as a platform to work from for long periods of time. Portable ladders are used for short-term or quick jobs, such as changing a light bulb or connecting fixture wiring. Employees using portable ladders shall:

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- a. Do longer-term or more complex jobs, such as changing out equipment, from work platforms, such as scaffolding or man-lifts.
- b. Document the reason a work platform is not feasible and a ladder is necessary for any of these longer-term or complex jobs to include:
 - (1) The specifics of the fall protection system or plan to be used on the ladder.
 - (2) Written approval for the system or plan from the JSC or company Fall Protection Program Administrator.
 - (3) Written concurrence from the Safety and Test Operations Division.
- c. Always follow the manufacturer's recommendations when working with ladders, including Type I industrial stepladders, Type II commercial stepladders, and extension ladders.
- d. Follow 29 CFR 1910 Subpart D, "Walking-Working Surfaces," 29 CFR 1910.23, "Ladders," and 29 CFR 1926.1053, "Ladders" (for construction).
- e. Maintain three points of contact with the ladder when ascending or descending (one hand and two feet, or two hands and one foot) and keep the center of your body between the ladder rails.
- f. Place ladders on stable and level surfaces to prevent slipping, tie them off, or have someone hold the ladder in a steady position.
- g. Never have more than one person on a ladder unless it is specially designed for this use.
- h. Adjust extension ladders while standing at the base of the ladder and make sure the locks are properly engaged. Never make adjustments while standing on the ladder.
- i. Erect two-section extension ladders so the upper section is resting on the bottom section.
- j. Never use the top or top step of stepladders as a step.
- k. Never use a closed stepladder as a vertical ladder.
- l. Use care in safely placing, securing, or holding a ladder being used on oily, metal, concrete, or slippery surfaces. Nonslip bases may not be adequate. Make sure the ladder is secured and stabilized before use.

NOTE: Fall protection is not required for short-term quick jobs from a portable ladder.

8.7.5 Requirements for working with fixed ladders

8.7.5.1 Employees working with fixed ladders shall:

- a. Always follow the manufacturer's recommendations.
- b. Design, build, use, and maintain fixed ladders as described in 29 CFR 1910.23, "Ladders."
- c. Face the ladder when climbing or descending.
- d. Raise or lower tools or other equipment with lanyards, tool belts, or aprons. Don't carry tools in your hands when ascending or descending a ladder.
- e. Allow only one person on a ladder section at a time.
- f. Ensure all new fixed ladders and replacement ladder and ladder sections extending more than 24 feet have a ladder safety or personal fall protection system.

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NOTE: Organizations with existing fixed ladders extending more than 24 feet and have only cages or wells have until 2036 to ensure that these ladders are equipped with ladder safety or personal fall protection systems.

8.7.6 Ladder inspection

8.7.6.1 Employees using ladders shall inspect ladders before each use and inspect and test any ladder involved in an incident, such as tipping over, or one exposed to extreme heat (fire) for deflection and loss of strength and follow these requirements:

- a. A competent person shall inspect each ladder at least yearly and:
 - (1) Document each yearly inspection on an inspection tag with the inspector's initials and date for next inspection.
 - (2) Take defective ladders out of service using an "Out of Service" tag (JSC Form 1243).
 - (3) Make sure defective ladders are properly repaired or destroyed.
- b. Ladder inspections shall cover the following and any additional items in the manufacturer's instructions:
 - (1) Overall condition and maintenance.
 - (2) Tight joints between the steps and side rails.
 - (3) Securely attached fittings.
 - (4) Movable parts – must move freely.
 - (5) All rung and hardware connections and rivets for shearing.
 - (6) Loose or broken steps or rungs.
 - (7) Excessively dented rungs.
 - (8) Broken, split, or cracked uprights, braces, steps or rungs.
 - (9) Rail dents or bends.
 - (10) Loose nails, screws, bolts, rivets, rung-to-side-rail connections, or hardware connections.
 - (11) Missing, broken, or damaged safety shoes, nonslip bases, casters/wheels, or locking devices.
 - (12) Loose, bent, or broken hinges or spreaders on stepladders.
 - (13) Defective locks on extension ladders.
 - (14) Deteriorated or broken ropes or sheaves on extension ladders.
 - (15) General serviceability.

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8.7.7 How to keep portable ladders safe

8.7.7.1 Employees working from ladders shall always follow the manufacturer's recommendations and ensure:

- They follow 29 CFR 1910 Subpart D, "Walking-Working Surfaces," 29 CFR 1910.23, 29 CFR 1910.26, and 29 CFR 1926.1053 (for construction).
- Apply a protective coating, such as varnish, to ladders that are subjected to certain acid or alkali solutions. Don't apply opaque paint to ladders; it would hide defects.
- Metal ladders are made with corrosion-resistant material or protected against corrosion.
- Rungs and steps of portable metal ladders are corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize the possibility of slipping.
- Each stepladder or combination ladder used in a stepladder mode is equipped with a metal spreader or locking device that securely holds front and back sections in an open position while the ladder is in use.
- Ladders are not loaded beyond the maximum intended load, including the total load (weight and force) of the employee and all tools, equipment, and materials being carried.

8.7.8 Safety Net System

A safety net system is a horizontal or semi horizontal, cantilever-style barrier using a netting system to stop falling workers before they make contact with a lower level or obstruction. Use safety nets as required in Chapter 8.8, paragraph 8.8.7.

8.7.9 Description of, and standards that apply to, scaffolds

8.7.9.1 A scaffold is any *temporary* elevated platform (supported or suspended) and its supporting structure (including points of anchorage) used for supporting employees or materials or both. Two OSHA standards apply to scaffolds:

- 29 CFR 1926, Subpart L, "Scaffolding," applies to scaffolds used in construction work. Construction work is any work for construction, alteration, or repair, including painting and decorating.
- 29 CFR 1910.27, "Scaffolds and rope descent systems," applies to any nonconstruction work.

8.7.10 Scaffolding-competent person – inspection and maintenance of scaffolds

8.7.10.1 The scaffolding-competent person shall:

- Design, build, erect, and maintain scaffolds as described in 29 CFR 1910.28 and 29 CFR 1926, Subpart L (for construction).
- Be trained by scaffolding-competent persons designated by a scaffold manufacturer or employer. Never inspect, repair, or maintain scaffolds used in construction unless you are trained as described in subparagraph 8.7.16.1.d.
- Maintain scaffolds and other devices in a safe condition. Correct any defects, unsafe conditions, or noncompliance immediately before further use. Never use any broken, bent, excessively rusted, altered, or otherwise structurally damaged frames or accessories.

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- d. Never use scaffolding components from different manufacturers or systems together, unless specifically authorized to do so by the scaffolding manufacturer.
- e. Inspect scaffolds and scaffold components for visible defects before each work shift and after any occurrence which could affect a scaffold's structural integrity . The supervisor, safety representative, or Safety and Test Operations Division can help in these inspections. Record, date, and maintain the inspection reports in the office of the responsible organization.
- f. Inspect wire ropes, fiber ropes, slings, hangers, platforms, and other supporting parts for defects before each installation. Before each workshift, and after every occurrence which could affect its integrity.
- g. Periodically inspect all welded frames and accessories. Also inspect any maintenance, such as painting or minor corrections, authorized by the manufacturer before further use.
- h. Remove defective equipment from service immediately. A designated scaffolding-competent person, safety representative, or supervisor shall put a WARNING – DO NOT OPERATE tag (JSC Form 19A) on the equipment until it is repaired or destroyed.

8.7.11 Scaffolding-competent person – Erecting scaffolds

8.7.11.1 The scaffolding-competent person shall observe the requirements as described in 29 CFR 1910.27; 29 CFR 1926, Subpart L (for construction); the manufacturer's recommended work practices; and the following requirements for operations involving scaffolds:

- a. Use only designated competent, experienced personnel to erect scaffolds or to supervise the erection of scaffolds. Never erect, disassemble, or move scaffolds used in construction unless trained as described in subparagraph 8.7.16.1.d.
- b. Provide an access ladder or equivalent safe access onto scaffolds.
- c. Separate the area under scaffolding or elevated work from other areas by suitable barricades to prevent personnel travel under the platform and to protect from falling objects.
- d. Install outriggers on scaffolding as directed by the manufacturer, or whenever the height of the scaffold system exceeds four times the minimum base width.
- e. Check for and avoid getting too close to electrical equipment - for example, crane rails.
- f. Maintain clearance between scaffolds and power lines to meet 29 CFR 1926.451. Never erect, use, dismantl, alter, or move a scaffold such that it, or any conductive material handled on it might come close to exposed and energized power lines.

8.7.12 Requirements for working on any scaffold

8.7.12.1 Employees who use scaffolding shall follow the manufacturer's recommended work practices as well as 29 CFR 1910.27 or 29 CFR 1926, Subpart L (for construction), and:

- a. **Never** assemble or disassemble a scaffold used in construction unless trained as described in subparagraph 8.7.16.1.c.
- b. **Never** work on scaffolds used in construction unless trained as described in subparagraph 8.7.16.1.d.

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- c. **Never** alter or move a scaffold horizontally while in use or occupied unless it is designed by a registered professional engineer specifically for such movement or, for mobile scaffolds, where the provisions of 1926.452(w) are allowed.
- d. **Never** exceed the intended working load for the scaffold or rated capacities, whichever is less.
- e. **Never** work on scaffolds during storms or high winds or if the scaffold is covered with ice or snow. Remove ice and snow and sand from the planking to prevent slips.
- f. **Never** accumulate tools, materials, and debris in quantities that could cause a tripping hazard.
- g. **Never** use "shore" or "lean-to"-type scaffolds.

8.7.13 Requirements for working with suspended scaffolding

8.7.13.1 Employees working with suspended scaffolding shall observe the manufacturer's recommended work practices: 29 CFR 1910.27 and 29 CFR 1926, Subpart L (for construction); and the following requirements for operations involving suspended scaffolding:

- a. Employees who erect, or supervise the erection of, suspended scaffolding shall be trained and designated by the scaffolding manufacturer or employer as a suspended scaffold-competent person. Never erect, disassemble, move, or use scaffolds in construction unless trained as described in subparagraph 8.7.16.1.d.
- b. Inspect all ropes, slings, hangers, platforms, and other supporting parts for defects, corrosion, or rusting before each installation and use. Replace wire ropes with six or more broken wires in any one lay of the wire rope. A "lay" is the distance it takes one strand to make a 360-degree wrap around the rope. Also replace damaged or deteriorated ropes.
- c. Use a harness attached to an independently supported lifeline through a fall-arrest device (rope grab) while working on a suspended scaffold. Attach the lifeline to substantial members of the structure that are independent of the scaffolding.
- d. Secure all suspended scaffolding portable components supporting the scaffold (such as parapet clamps or hooks) with secondary tiebacks to substantial members of the structure.
- e. Allow only two workers (with their tools) on a suspension scaffold rated at a working load of 500 pounds and only three workers (with their tools) on a suspension scaffold rated at 750 pounds.
- f. Set up all suspended scaffolding portable components supporting the scaffold (primary and secondary tiebacks) so that only one device is attached to a preformed exposed aggregate facade panel section.

8.7.14 Requirements for working with power-operated platforms

8.7.14.1 Employees working with power-operated platforms shall:

- a. Install, operate, use, maintain, and inspect power-operated platforms for exterior building maintenance as described in 29 CFR 1910.66, "Powered Platforms for Building Maintenance." The requirements of this section don't apply to firefighting equipment or to the vehicles with mounted aerial devices, except that the vehicle shall be a stable support for the aerial device.

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- b. Never move, operate, repair, maintain, or inspect power-operated platforms used in construction unless trained as described in subparagraph 8.7.16.1.e.
- c. Never disable any required safety device or electrical protective device, except when necessary during tests, inspections, and maintenance. Restore the devices to their normal operating condition immediately after completing such tests, inspections, and maintenance.
- d. Never operate powered platforms during severe adverse weather conditions as determined by your supervisor or the Safety and Test Operations Division.
- e. Make sure that each employee on the working platform is protected by a personal fall arrest system as described in Chapter 8.8.
- f. Make sure all powered platforms have an acceptance test to verify all parts meet 29 CFR 1910.66 specifications and all safety and operating equipment functions as required. Make a similar inspection and test after any alteration to an existing powered platform installation.

8.7.15 Requirements for working with other elevated platforms

8.7.15.1 Employees working with other elevated platforms shall:

- a. Design, construct, test, operate, and maintain aerial devices, aerial ladders, articulating boom platforms, extensible boom platforms, and other types of vehicle-mounted elevating and rotating work platforms as described in 29 CFR 1910.67, "Vehicle-Mounted Elevating and Rotating Work Platforms," and in the manufacturer's instructions.
- b. Follow 29 CFR 1910.68, "Manlifts," and manufacturer's instructions for manlifts.
- c. Never move, operate, repair, maintain, or inspect elevating and articulating boom platforms used in construction unless trained as described in subparagraph 8.7.16.1.e.
- d. Never move, operate, repair, maintain, or inspect elevated platforms used in construction unless trained as described in subparagraph 8.7.16.1.e.
- e. Consider the following when operating aerial lifts close to, under, over, by, or near electric power lines:
 - (1) For lines rated at 50 kV or less, the minimum clearance between the lines and any part of the aerial lift shall be at least 10 feet.
 - (2) When the lines are rated over 50 kV, the minimum clearance between the lines and any part of the aerial lift shall be at least 10 feet plus 0.4 inch for each kilovolt over 50 kV, or twice the length of the line insulator, but never less than 10 feet.
 - (3) These requirements don't apply if the work is performed from an aerial device insulated for the work and the work is performed by either telecommunications employees who are trained and qualified as linemen, line-clearance tree-trimming employees, or electric utility employees; or where the electric power transmission or distribution lines have been de-energized and visibly grounded at the point of work, or where insulating barriers, which are not a part of or an attachment to the aerial lift, have been erected to prevent physical contact with the lines.

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- f. Treat any overhead wire as energized until the person owning the line, his or her representative, or the electrical utility authorities verify it is de-energized and locked and tagged out as per the JSC NASA LO/TO specifications.
- g. Use proximity warning devices, but not in lieu of meeting the requirements contained in subparagraph a above.
- h. Notify the owner of the lines or his or her authorized representative and provide them with all pertinent information before beginning operations near electrical lines. In the case of JSC, the JSC Plant Engineering Division shall notify the utility company before starting work near electrical lines. Also, notify the owner of the electrical lines when the work is completed.

8.7.16 PPE and clothing to use when using ladders, scaffolding, or elevating work platforms

Employees shall wear PPE consistent with the guidelines below. For more information on PPE, see Chapter 5.6.

<i>If . . .</i>	<i>You shall wear . . .</i>
Objects could fall on your head, you could bump your head, or you could come in contact with electrically energized equipment	Hard hats.
Objects could fall into or be blown into your eyes	Safety glasses with side protection, goggles, and a face shield if required (such as for grinding).
You must lift sharp or pointed objects by hand	Gloves.
You must lift heavy objects over your feet, or you may step on sharp or pointed objects	Industrial work shoes, safety toed or equipped with metatarsal protection (as needed).
You could fall	All items specified by the manufacturer's recommended work practices. Note: Going from one level to another level on portable ladders does not require fall-protection equipment.
You are working on a suspended scaffold	A harness with a rope grab device attached to an independently supported lifeline.
You are working in a boom lift, a scissor lift, or an aerial platform	A harness secured to the platform, unless specifically waived by the manufacturer's recommended work practices. Note: While on powered platforms with hand or guardrails in place, you shall be secured in the platform and keep your feet on the deck to prevent fallout in case the platform tips.
You are using a ladder as a work platform for longer-term or more complex jobs (short-term jobs such as changing a light bulb or adjusting an air-conditioning ducting mixing chamber are acceptable)	A fall-protection system and document the reasons why you can't do the work on a standard platform.

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You work 4 feet above grade (6 feet in construction) without a fall-protection system in place (with the exception of working on a portable ladder)	Independently supported lifelines properly connected to an anchorage rated at 5,000 pounds or more, harness, and shock absorber (if needed to limit impact force to 1,800 pounds), or a work-positioning system.
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8.7.17 Required training before using ladders, scaffolding, or elevated work platforms

8.7.17.1 Training shall cover the requirements recommended by the manufacturer of the equipment that you intend to use. See Chapter 4.1, "Safety and Health Training," for more requirements on training. Employees who:

- a. Supervise the construction, erection, testing, assembly, use, disassembly, lowering, maintenance, or storage of ladders, scaffolds, or work platforms or do these functions unsupervised shall be trained in the safe work practices described in this chapter and the referenced OSHA standards.
- b. Do any of the functions listed in a above shall be specifically designated and classified by their employer as being competent and qualified due to:
 - (1) Knowledge and experience.
 - (2) Awareness of the hazards associated with the specific equipment in the specific environment.
- c. Work on any kind of scaffold used in construction shall have the Scaffold Users Training.
- d. Erect, disassemble, move, operate, repair, maintain, or inspect scaffolds used in construction shall be trained in the requirements of 29 CFR 1926.454(b), "Training Requirements," and Appendix D, Subpart L, of 29 CFR 1926.
- e. Move, operate, repair, maintain, or inspect any kind of aerial lift used in construction shall be trained in the requirements of 29 CFR 1926.453, "Aerial Lifts." Aerial lifts include the following:
 - (1) Power-operated platforms
 - (2) Other elevated platforms
 - (3) Extensible and articulating boom platforms