EQUIPMENT & POWER TOOLS SAFETY

5

SCAFFOLDS

Scaffolds shall be erected, moved, dismantled or altered only under the supervision of competent persons, in accordance with 29 CFR 1926.451.

Tubular scaffolds shall be constructed to support at least four times the anticipated weight.

Wood pole scaffolds shall be constructed in compliance with 29 CFR 1926.451(b).

General Safety:

- Scaffolds shall be inspected daily before use.
- Adequate sills for scaffold posts and base plates shall be used.
- Footings shall be sound, rigid and level.
- Unstable objects such as boxes or concrete blocks shall not be used as footings.
- Adjusting screws (not blocking) shall be used to adjust to uneven grades.
- Scaffolds shall be plumbed and leveled as they are built up to ensure braces fit without forcing.
- Braces shall be fastened securely.
- All brackets shall be seated properly — side brackets parallel to the frame, and end brackets at 90 degrees to the frame.
- Free-standing scaffold shall be anchored to the structure at a height of 20 feet and every 20 feet thereafter. This anchorage shall be provided at 30 foot intervals horizontally.
- Ladders or makeshift devices shall not be used on top of scaffolds to increase height.
- Scaffolds shall not be overloaded.
- Safe and convenient access shall be provided to the platform level by ladder, ramp, or stairway, properly secured to the scaffold.
- Employees working on and under scaffolds shall wear hard hats. Work done over employees working on a scaffold requires planking or other suitable protection positioned not more than 9 feet above the working platform.

Planking:

- Working platforms shall be solidly planked, using only scaffold grade lumber.
- All planking shall be overlapped at least 12 inches, and both ends cleated.
- Plank ends shall not extend less than 6 inches nor more than 12 inches beyond supports. Spacing between planks is prohibited.

Guardrails and Toeboards:

• Guardrails and toeboards shall be installed on all open sides and ends of platforms more than 10 feet above the ground or floor.
• Scaffolds 4 feet to 10 feet in height, having a minimum horizontal dimension in either direction of less than 45 inches, shall have standard guardrails installed on all open sides and ends of the platform.
• Wood railing shall be a minimum of 2 x 4 inches, approximately 42 inches high, with a midrail.
• Supports shall be at intervals not to exceed 8 feet.
• Toeboards shall be a minimum of 4 inches in height.
• Where scaffolds are over walks, highways or work areas, spaces between toeboard and top rail shall be screened.

[REF: ANSI A10.8]

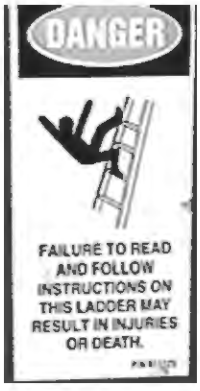
LADDERS:

Portable ladders are designed as one person equipment with the proper strength to support the worker, tools, and materials. Ladders are constructed under three general classes.

• Type I — Industrial: heavy-duty with a load capacity not more than 250 pounds.
• Type II — Commercial: medium-duty with a load capacity not more than 225 pounds. (Suited for painting and similar tasks.)
• Type III — Household: light-duty with a load capacity of 200 pounds.

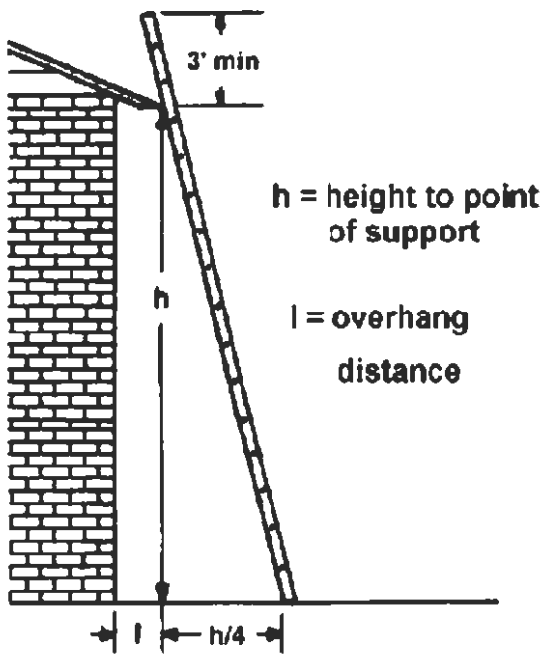
SAFE WORK PROCEDURES:

• Ladders shall be maintained in good condition.
• Joints between steps and side rails shall be tight, with hardware and fittings securely attached. Movable parts shall operate freely without excessive play.
• Ladders shall be maintained in good condition and have labels prominently displayed.

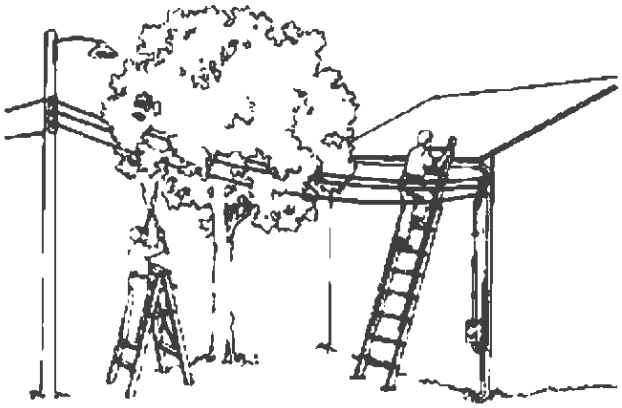


• Rungs shall be free of grease and oil.
• Ladders shall be inspected frequently, and if necessary, repaired, or removed from service. Ladders removed from service shall be destroyed and discarded.
• Older ladders shall be inspected for loose joints or rungs, cracks and rot.
• Ladders shall not be painted.
• Do not use ladders in a horizontal position as platforms, runways, or scaffolds.
• Wood ladders shall be stored in a dry location with adequate ventilation.

• Ladders shall not be placed on an unstable base to obtain additional height, nor spliced to increase length.
• When ladders are placed in front of door openings, doors shall be blocked open, locked, or guarded to prevent anyone using the door.
• Don't use the top of a stepladder as a step.
• Ladders stored in a horizontal position or carried on vehicles shall be supported adequately to avoid sag or permanent set.
• If both hands are occupied while on a ladder, a safety harness shall be used.
• Ladders used to gain access to a higher working surface shall be secured at the top, and extend at least 3 feet beyond the top support.
• When a ladder is used to get on or off a roof, secure the ladder by tying. The side rails should be at least 42 inches above the roof to be safe. Job-made ladders should let you get on or off a ladder by stepping between the rails. If you have to step around a ladder because of rungs, there should be a grab rail attached to the building to help you. (OSHA requires the grab rail and tie-off if a ladder doesn't extend at least 36 inches above the roof.) If there is a high parapet wall, use a stairway or some other way to get on or off the parapet.



• Use the one-to-four (1:4) ratio when using a ladder. To do this, place the ladder so its base is one foot away from what it leans against for every four feet in height to the point where the ladder rests.
• Tools and accessories shall be carried in tool pouches.
• Ladders shall not be used in a horizontal position for platforms or scaffolds, or as guys, braces or skids, or for other than their intended purposes.
• Load capacity shall be checked before a ladder is used.
• Ladders shall not be used by more than one person at a time.
• Rungs and steps shall be corrugated, knurled, dimpled, or coated with a skid resistant material to minimize slipping.



• Metal ladders shall be signed "CAUTION - DO NOT USE NEAR ELECTRICAL EQUIPMENT". Where ladder use is in an area where contact with energized electrical equipment could occur, ladders should have nonconductive side rails. *

•Danger! Metal conducts electricity! Keep metal ladders away from power lines and live electrical wires*.

*See the Electrical Hazards section in this Code of Safe Practices for more information about electrocution hazards.

Inspecting a ladder:

OSHA says a ladder must be inspected regularly for visible defects by a competent person and after any incident that could affect its safe use. Check your ladder for damage before each use. If a ladder is damaged, label it and report it to your Supervisor. Do not use it.

Here is a checklist for inspecting ladders:

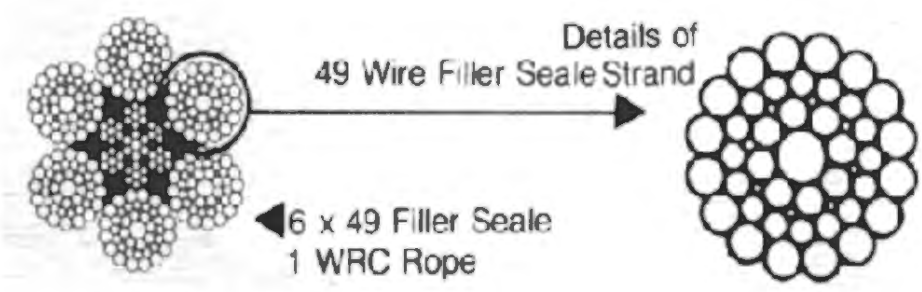
- Make sure the feet work and are not broken – and slip-resistant pads on the feet are secure.
- Inspect ladder parts for cracks, bends, splits, or corrosion.
- Check all rung and step connections.
- Make sure rung locks and spreader braces are working.
- On extension ladders, make sure the rope and pulley work and the rope is not frayed.
- All bolts and rivets should be secure.
- All rung locks and other movable parts should be oiled or greased.
- Make sure the steps, rungs and other ladder parts are free of oil, grease, and other materials.

[REF: ANSI A14.3-84, A14.1-90, A14.2-90, A14.4-92, A14.5- 92, A14.7-91]

WIRE ROPE

Wire rope failure, in many cases, is the result of undersized rope and/or incorrect rigging hardware being used at the time of installation. More often, breakage occurs due to misuse and/or
inadequate maintenance.

Wire rope composition



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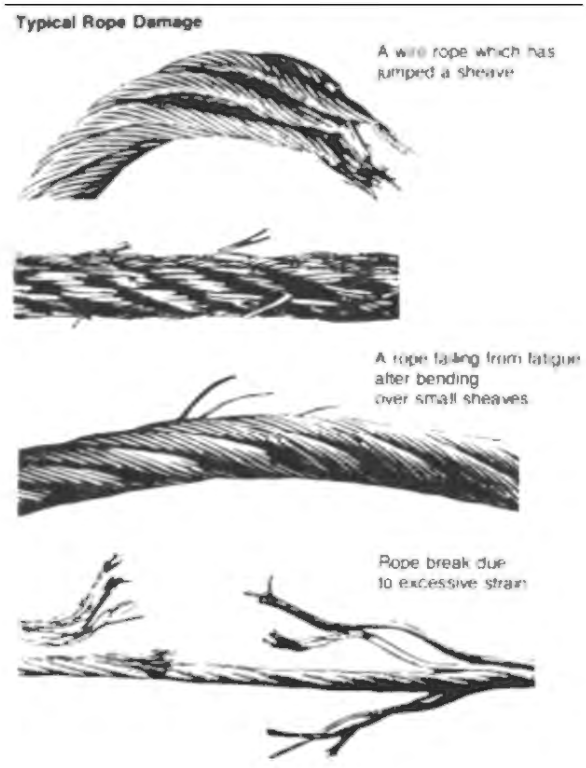
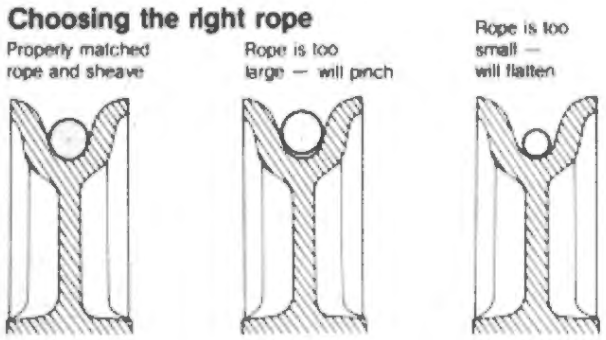
1. A wire rope is composed of a number of wire strands formed helically around a central axis. The axial member is known as the core, and may be made of various materials, such as fiber or steel.
2. Wire rope is aptly described as a precision machine. In operation, its strands change position with respect to each other. Individual wires within each strand perform in a similar manner. The relationship between these parts is carefully engineered to permit the rope to function smoothly in operation.
3. As with other precision equipment, internal lubrication must be provided during fabrication.
4. This combats frictional forces (which oppose movement of parts) and prevents corrosion.
5. Operating factors which affect a rope in service are tension, wear, bending, crushing and corrosion. Neglect and misuse will substantially reduce a wire rope's useful life.
6. Wire rope is available in a variety of grades and configurations. To the layman, the critical factors in selecting a rope are breaking strength and diameter.



7. An adequate factor of safety is crucial in wire rope use. The recommended safety factor for hoisting rope is typically 5:1. In other words, if the object to be hoisted weighs one ton, the wire rope used must have a minimum ultimate breaking strength of five tons.

8. Rope diameter is important for compatibility with rigging hardware. In particular, the wire rope must seat properly in the sheaves (pulleys) to ensure freedom of movement without undue wear to rope or sheave.



Points to ponder:

• Careful installation of a new wire rope is critical. Kinking will do irreparable damage and render the kinked portion of the rope useless. Installation of wire rope should be left to someone who has thorough knowledge of safe rigging procedures.

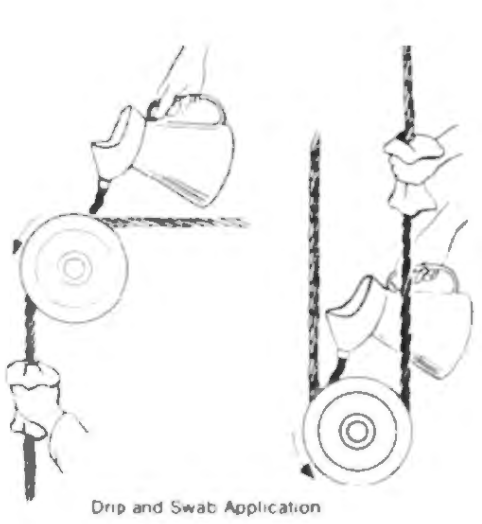
• The sheaves over which the wire rope travels must be of the exact size specified for the rope being used, and should be properly aligned. Check the condition of sheaves on a regular, scheduled basis. Sheaves that are 'frozen' due to corrosion will cause the wire rope to saw its way through.

• Ensure that the rope spools properly on the winch drum. It should never be allowed to cross-wind.

• A wire rope thimble should be used in the loop eye at the end of the rope that is attached to the unloader. The thimble prevents kinking. U-bolt wire rope clips must be attached with the base of the clip bearing against the live end of the rope, while the 'U' of the bolt presses against the dead end. Clip nuts should be tightened before a rope is placed under tension, and again after the load is on the rope.

Care and lubrication:

1. Rope condition can be checked and lubrication applied during the hoisting procedure. Watch for localized wear; premature wear at one spot is common and can be prevented if the cause is detected. Uneven wear can be minimized by moving the rope periodically so that different stretches of it are at the critical wear points. Consult a knowledgeable authority before attempting such a change.


Drip and Swab Application

2. Wire rope should be clean and dry before lubrication is applied. Use a wirebrush or compressed air in conjunction with a recommended cleaner-solvent to remove old

lubricant and debris.

3. Recommended lubricants and proper application are a must. Wire rope manufacturers can provide specific details. Never apply used crankcase oil; it contains small metal particles that can damage wire rope.

[REF: ANSI/ASME B30]

USE OF TOOLS

In order to perform efficiently and safely, tools must be kept in good condition and used only for the purposes for which they were intended.

1. Repair or replace broken, loose, or splintered handles and tools with burrs, cracks, or mushroomed heads.
2. Do not use hand tools on moving objects or machinery in motion.
3. Avoid excessive force with hand tools.
4. Use only portable electric equipment that is in good condition and is double insulated or properly grounded. Safety shutoff switches, where provided, should be operational.
5. Electric cords to power tools shall be in good condition and placed where they will not be damaged, run over by equipment, or cause a tripping hazard.
6. All extension cords shall have three-pronged connectors and shall be in good condition.
7. Portable handlamps shall have neither switches nor plugin receptacles in the lampholders.
8. Avoid using electrical power tools in wet locations.
9. Keep fingers and clothing away from revolving machinery, and ensure that all guards are in place.
10. Do not use highly compressed air to blow dust or chips from the work area.
11. Inspect compressed air hoses frequently to ensure they are not leaking and can withstand rated pressure.
12. Keep compressed air hoses off of the ground and neatly coiled when not in use.

STATIONARY POWER TOOLS AND MACHINES

Stationary power tools and machines are specialized pieces of equipment and shall be operated only by those who have been properly trained in their use. Some general rules regarding this equipment apply as follows:

- The work area shall be kept clean. Chips, scraps, and debris shall be cleaned up and disposed of at regular intervals. Oil and grease shall not be permitted to accumulate on the equipment or surrounding area.
- All belts, pulleys, gears, sprockets, chains, and rotating shafts less than seven (7) feet above the floor shall be guarded.

Safe practices for specific pieces of equipment are as follows:

Grinders:

- The tool rest should be kept adjusted to within 1/8 inch of the wheel and tongue guards to within 1/4 inch of the wheel.
- The side guard shall cover the spindle, nut and flange, and 75 percent of the wheel diameter.
- Goggles or face shields shall be worn when grinding. These shall be kept in the vicinity of the grinder.
- Do not grind material on the side of the abrasive wheel unless the wheel is so designed.

Lathe:

- Ensure that stock is properly centered.
- Rotate stock by hand to determine the clearance of the tool rest.
- Avoid heavy cuts.
- Keep hands out of revolving stock.
- Do not leave tools on the bed while operating the lathe.
- Goggles or face shields shall be used when cutting.

Drill Press:

- Change belt speeds only when machine is stopped.
- Use correct speeds for all operations.
- Use clamps or fixtures to hold work.
- Use goggles or face shields when drilling metal.

Saws: Radial Arm and Table:

- Guards shall be in proper position and secured in place.
- Use a push stick when necessary.
- Do not force material through the saw.
- The blade shall not project more than 1/8 inch above the work.
- Use a guide to cut by; never saw free hand.
- Lower the blade beneath the table when cutting operation is completed.
- All adjustments should be made before starting the machine.
- Use goggles or face shields when cutting metal or hoses.

Band Saws and Power Hack Saws

- All guards shall be in place prior to use.
- Adjust the upper guide for clearance. Too high a setting leaves the saw unguarded.
- Small chips which lodge in the guide blocks should be removed or they may jam the blade.
- Do not backtrack; always cut clear of the saw.

Sanders:

- Belt sanders should be properly aligned to keep the belt on the rollers.
- When using the disc sander, sand on the downward rotation.
- Do not use torn belts or discs.
- Use care when sanding splintered stock.
- Ensure that sanding dust is removed through proper ventilation, or wear a dust mask.

[REF: 29 CFR 1910.211 and ANSI/UL 987]