

SECTION 31

TREE MAINTENANCE AND REMOVAL

31.A GENERAL

31.A.01 References.

- a. ANSI Z133.1 - Tree Care Safety Standard;
- b. 29 CFR 1910.266 - Logging Operations;
- c. 29 CFR 1910.269 - Electrical Power Generation, Transmission, and Distribution;
- d. International Society of Arborist Safety Standards.

31.A.02 Tree maintenance or removal shall be performed under the direction of a qualified tree worker and in accordance with references above. The services of a certified arborist may also be necessary to properly access the required maintenance to be performed.

31.A.03 Working near electrical equipment and systems. > **See Section 11 and 29 CFR 1910.269.**

- a. Employees working in the proximity of electrical equipment or conductors shall consider them to be energized.
- b. A qualified tree worker shall make a visual inspection to determine whether an electrical hazard exists before climbing or before performing any work in or on a tree. If electrical lines or equipment cannot be safely avoided, arrangements shall be made with the power company to de-energize the power.
- c. Only a qualified line-clearance tree trimmer or line-clearance trainee under the direct supervision of a qualified person shall be assigned to work in close proximity to electrical hazards.

EM 385-1-1
15 Sep 08

d. There shall be a second qualified line-clearance tree trimmer or line-clearance tree trimmer trainee within normal voice communication during the clearing operations aloft under the following conditions:

(1) When the line-clearance tree trimmer or line-clearance tree trimmer trainee must approach any closer than 10 ft (3 m) to any conductor or electrical apparatus energized in excess of 750 volts;

(2) When branches or limbs being removed cannot first be cut (with a pole pruner/pole saw) sufficiently clear of the equipment or conductors so as to avoid contact; or

(3) When roping is required to remove branches or limbs from such equipment or conductors.

e. Line-clearance tree trimmers and trainees shall maintain the distances from energized conductors as specified in Table 11-3. All other tree workers shall maintain a safe distance of 10 ft (3 m) or greater according to Table 11-1.

f. Bucket Trucks and Aerial Lifts that are electrically rated above the electrical voltages of adjacent power lines are exempt from the 10 ft (3 m) rule, and can follow Table 11-3 if workers have been electrically qualified. Ladders on aerial lift devices may not be brought closer to an energized part than the distance listed in Table 11-3.

g. Electrically rated buckets shall be tested yearly with approved test equipment.

31.A.04 Equipment.

a. Equipment shall be inspected, maintained, repaired, and used in accordance with the manufacturer's instructions.

b. Employees shall be instructed in the safe and proper use of all equipment provided to them.

c. See Appendix P for Climbing Equipment Requirements.

31.A.05 Climbing ropes shall not be used to lower limbs or other parts of trees or to raise or lower equipment.

31.A.06 Tool handles shall be used when raising and lowering tools.

31.A.07 Tools used for cabling, bark tracing, cavity work, etc., shall be carried in a bag, belt, or sheath designed to hold tools and not put in the pockets or stuck in the top of a boot.

31.A.08 Aerial Platforms and Buckets.

a. Tree Workers in a bucket or work platform shall use fall protection in accordance with manufacturer's recommendations. Workers shall be positively secured to the work platform at all times but especially during transit between the tree and platform. The employee shall be safely secured to the tree prior to removing the lanyard attached to the basket.

b. If a lanyard longer than 1 ft (.3 m) is used, and the fall potential is greater than 2 ft (.6 m) , then a full body harness will be used. If a short lanyard is used for restraint only and the fall potential is less than 2 ft (.6 m), then a climber's belt may be used with attachment points on the sides or front. Lanyards longer than 1 ft (.3 m) used for fall arrest rather than restraint shall be of the shock absorbing type that reduces the arresting force to 900 lbs (4 kN). The shock absorbing side of the lanyard shall be attached to the back of the harness. All snap hooks and carabineers shall be of the triple action type and rated for 5000 lbs (22.2 kN) meeting ANSI Z359.1 standard.

31.B TREE CLIMBING

31.B.01 Tree Climbing Techniques.

a. All tree work operations above a height of 12 ft (3.6 m), whether there are electrical hazards or not, shall require a second worker in the area. If climbing is being performed, the 2nd worker shall also be a qualified climber, capable and knowledgeable of rescue techniques, including self rescue.

b. Use of Rope Access techniques should only be used where other means of access or undertaking the work such as mechanically operated work platforms or pole saws are not practical. > **See Appendix P for recommended rope climbing equipment, techniques, and safety practices.**

31.B.02 The climber shall inspect the tree and surrounding area for hazards and perform a risk assessment of the tree and work site. Some issues to be considered are: power lines, tree hangers or broken and dead branches, entanglement with adjacent or downed trees, shape and lean of the tree, tree damage from wind, lightning, disease, location of septic lines and tanks and other potential at-grade or below-grade utilities that could be impacted. Debris and other objects shall be removed from beneath the climber whenever possible. Weather conditions shall be assessed as well as location of adjacent structures. Adverse weather conditions may include lightning and thunderstorms in the area.

31.B.03 Tree crews, where climbing is required, shall have a secondary climber that could assist in a rescue if necessary or the crew shall be working in proximity to nearby crews with a climber who could assist in a rescue if needed.

31.B.04 A tree worker shall be tied in with an approved type of climbing rope and safety saddle when working above the ground. This does not necessarily apply to a worker ascending into a tree. Work may be performed while standing on a self-supporting ladder only when the worker is tied off as required.

31.B.05 The climbing rope (working line) shall be passed around the trunk of the tree as high above the ground as possible using branches with a wide crotch to prevent any binding of the safety rope (safety line). **Exception: Palms and other trees with similar growth characteristics that will not allow a climbing rope to move freely.** The crotch selected for tying should be directly above the work area, or as close to such a position as possible, but located in such a way that a slip or fall would swing the worker away from any electrical conductor. The rope shall be passed around the main leader or an upright branch, using the limb as a stop. Feet, hands, and ropes shall be kept out of tight V-shaped crotches.

31.B.06 A figure-eight knot shall be tied in the end of the rope, particularly when climbing high trees, to prevent pulling the rope accidentally through the taut-line hitch and possibly falling.

31.B.07 The tree worker shall be completely secured with the climbing line before starting the operation. The climbing line shall be crotched as soon as practicable after the employee is aloft, and a taut-line hitch tied and checked. The worker shall remain tied in until the work is completed and he/she has returned to the ground. If it is necessary to recrotch the rope in the tree, the worker shall re-tie in or use the safety strap before releasing the previous tie.

31.B.08 A 5/8 in (1.5 cm) metal shackle shall be secured to the end of a support line that meets minimum standards for a climbing line. The support line shall be tied to the pin of the shackle with the climbing line placed through the shackle. The support line shall be tied off at the base of the tree or any other acceptable anchor.

31.B.09 Tree workers shall not carry tools in their hands while climbing. Chain saws and Tools shall be raised and lowered one at a time by means of a line, except when working from an aerial-lift device or during topping or removing operations.

31.B.10 Climbers should use chain saws less than 15 lbs (6.8 kg) and they should be connected to the climber by means of a saw lanyard.

EM 385-1-1
15 Sep 08

31.B.11 Climbing of dead and dying trees shall only be performed where no other safe and feasible alternative exists for removal of the tree. Climbers shall not trust the capability of a dead branch to support his/her weight. If possible, dead branches should be broken off on the way up and hands and feet should be placed on separate limbs.

31.B.12 Climbing with tree spurs on live trees is generally not allowed. Tree spurs used for large bark trees shall have longer gaffs, such as 2 ¾ in (7 cm). Gaff lengths of 1 ¾ in (4.5 cm) are intended only for pole climbing. Gaff lengths shall be suitable for the tree being climbed.

31.B.13 The climber may apply a variety of climbing techniques, but they must be approved by the GDA.

- a. Climbing without the use of tree spurs may be required.
- b. The most commonly used arborist rope climbing technique is the Advancing the Rope and Body Thrusting technique/Alternate Lanyard Technique.
- c. If the climber can remain near the trunk of the tree, he may use both the Belt Lanyard/Flip line and the Rope Advance (lifeline) technique. Otherwise, a single line access is permitted. If a lifeline (Access Line) cannot be set in the tree, then the use of two flip lines may be used.
- d. The use of auto-locking belays devices or tree climber's hitches are both permitted.
- e. Tree climbers shall not climb above their tie off point. Tie in points shall be well above the climber to prevent an uncontrolled pendulum swing in the event of a slip.
- f. Once in the tree, climbers shall be tied off at two points while working or using the chain saw, (this includes the primary support of the access line, and the flip line/lanyard/or buck

strap). Climbers may ascend or descend from the tree using only the access line by using approved single rope techniques. Once the worker is at the tie in point (TIP), a secure climbing system shall be installed and the climber should only disconnect from the access line when a new pitch and line have been established as required when moving higher into the tree.

g. Use of three point contact climbing is recommended if possible. Climbers may also use ground personnel to help pull them up the tree.

31.B.14 Climbers over the age of 40 years shall have obtained a medical clearance for heavy exertion work within the past 2 years.

31.C FELLING

31.C.01 Prior to felling operations, the employee shall consider:

- a. The tree and the surrounding area for anything that may cause trouble when the tree falls;
- b. The shape of the tree, the lean of the tree, and decayed or weak spots;
- c. Wind force and direction;
- d. The location of other people;
- e. Electrical hazards; and
- f. Other obstructions such as curb stops, meter pits, sewer clean outs, and gas lines.

31.C.02 Prior to felling operations, the work area shall be cleared to permit safe working conditions and an escape route shall be planned. Tree trimmers shall ensure that homes and structures are evacuated where trimming and felling operations are in close proximity.

EM 385-1-1
15 Sep 08

31.C.03 Felling paths shall be at least twice the distance as the height of the tree (due to limbs and debris being thrown after hitting the ground). Where this distance cannot be maintained, limbing may be required. Power lines may also need to be dropped or de-energized.

31.C.04 Each worker shall be instructed as to exactly what he is to do. All workers not directly involved in the operation shall be kept clear of the work area.

31.C.05 Before starting to cut, the operator shall be sure of his footing and must clear away brush, fallen trees, and other materials that might interfere with cutting operations.

31.C.06 A notch and backcut shall be used in felling trees over 5 in (12.7 cm) in diameter (measured at breast height). No tree shall be felled by "slicing" or "ripping" cuts.

- a. The depth or penetration of the notch shall be about one-third the diameter of the tree.
- b. The opening or height of the notch shall be about 2.5 in (6.3 cm) for each 1 ft (0.3 m) of the tree's diameter.
- c. The backcut shall be made higher (approximately 2 in (5 cm)) than the base of the notch to prevent kickback.

31.C.07 If sections of the tree are to be removed, sections shall be limited in length to 1/3 the distance to the nearest structure (e.g., If the tree is 30 ft (9 m) from the structure, sections shall be no more than 10 ft (3 m)).

>Note: the discretion of the tree trimmer must be used. In some instances it may be safer to fell a large trunk away from the structure rather than to remove it in small sections, especially where the tree has grown very close to the house or structure. If this is done, a rope should be used to help guide

the direction of the fall along with the use of proper notch and backcut.

31.C.08 The employee shall work from the uphill side whenever possible. Wind effect shall be considered when falling. The use of tag lines may be used to help in the direction of the fall provided the workers on the tagline are well clear of the fall path, such as twice the distance of the fall area.

31.C.09 Just before the tree or limb is ready to fall, an audible warning shall be given to all those in the area. All persons shall be safely out of range when the tree falls.

31.C.10 If there is danger that the trees being felled may fall in the wrong direction or damage property, wedges, block and tackle, rope, or wire cable (except when an electrical hazard exists) shall be used. All limbs shall be removed from trees to a height and width sufficient to allow the tree to fall clear of any wires and other objects in the vicinity. Manufacturer's recommendations will be strictly followed when using a loader, skid steer, or similar piece of equipment to push directly against the tree.

31.C.11 Special precautions shall be taken when roping rotten or split trees due to the potential for falling in an unexpected direction even though the cut is made on the proper side.

31.C.12 Persons shall be kept back from the butt of a tree that is starting to fall.

31.D BRUSH REMOVAL AND CHIPPING

31.D.01 Brush and logs shall not be allowed to create a hazard at the work site.

31.D.02 Employees working with a brush chipper shall be trained in its safe operation. The chipper shall be operated in accordance with the manufacturer's recommendations.

EM 385-1-1
15 Sep 08

31.D.03 Brush chippers.

- a. Rotary drum and disk-type tree or brush chippers not equipped with a mechanical in-feed system shall be equipped with an in-feed hopper not less than 85 in (2.2 m) (the sum of the horizontal distance from the chipper blade out along the center of the chute to the end of the chute and the vertical distance from the chute down to the ground) and shall have sufficient height on its side members to prevent personnel from contacting the blades or knives of the machine during normal operations.
- b. Rotary drum and disk-type tree or brush chippers not equipped with a mechanical in-feed system shall have a flexible anti-kickback device installed in the in-feed hopper for the purpose of protecting the operator and other persons in the machine area from the hazards of flying chips and debris.
- c. Disk-type tree or brush chippers equipped with a mechanical in-feed system shall have a quick stop and reversing device on the in-feed. The activating mechanism for the quick stop and reversing device shall be located across from the top, along each side of, and as close as possible to the feed end of the in-feed hopper and within easy reach of the operator.
- d. The feed chute or feed table of a chipper shall have sufficient height on its side members to prevent operator contact with the blades or knives during normal operation.
- e. A swinging baffle shall be mounted in front of the knives to prevent throwback of material.
- f. Brush chippers shall be equipped with an exhaust chute of sufficient length or design to prevent contact with the blade.
- g. Brush chippers shall be equipped with a locking device on the ignition system to prevent unauthorized starting of the equipment.

h. Brush chipper cutting bars and blades shall be kept sharp, properly adjusted, and otherwise maintained in accordance with the manufacturer's recommendations.

31.D.04 Trailer brush chippers detached from trucks shall be chocked or otherwise secured.

31.D.05 All workers feeding brush into chippers shall wear eye protection. Loose clothing, gauntlet-type gloves, rings, and watches shall not be worn by workers feeding the chipper.

31.D.06 Employees shall never place hands, arms, feet, legs, or any other part of the body on the feed table when the chipper is in operation or the rotor is turning. Push sticks (of material that can be consumed by brush chipper) shall be used.

31.D.07 Brush chippers shall be fed from the side of the centerline, and the operator shall immediately turn away from the feed table when the brush is taken into the rotor. Chippers shall be fed from the curbside whenever possible.

31.D.08 Material such as stones, nails, sweepings, etc. shall not be fed into brush chippers.

31.D.09 The brush chipper chute shall not be raised while the rotor is turning.

31.E OTHER OPERATIONS AND EQUIPMENT

31.E.01 Pruning and trimming.

a. Pole pruners, pole saws, and similar tools shall be equipped with wood or nonmetallic poles. Actuating cords shall be of a nonconducting material.

b. Pole pruners and pole saws shall be hung securely in a vertical position with the sharp edges away from employees.

EM 385-1-1
15 Sep 08

They shall not be hung on utility wires or cables or left overnight in trees.

c. When necessary, warning shall be given by the worker in the tree before a limb is dropped.

d. A scabbard or sheath shall be hooked to the belt or safety saddle to carry a handsaw when not in use.

e. A separate line shall be attached to limbs that cannot be dropped safely or are too heavy to be controlled by hand. The line should be held by workers on the ground end of the rope. Use of the same crotch for both the safety rope and the work rope shall be avoided.

f. Cut branches shall not be left in trees overnight.

g. A service line shall be put up for operations lasting overnight or longer and shall be used to bring the climbing rope back into position at the start of the next day's work.

31.E.02 Limbing and bucking.

a. Whenever it is possible to do so, the tree worker shall work on the side on which the limb is being cut.

b. Branches bent under tension shall be considered hazardous.

c. When topping or lowering limbs, consideration shall be given to the use of taglines to control the limbs. A separate line shall be attached to limbs that cannot be dropped or are too heavy to be controlled by hand. The use of the same crotch for both safety rope and work rope shall be avoided.

d. In bucking, tree workers shall stand on the uphill side of the work whenever possible. The tree worker shall block the log to prevent rolling when necessary.

- e. When bucking, wedges shall be used as necessary to prevent binding of the guide bar or chain.

31.E.03 Stump cutters shall be equipped with enclosures or guards that effectively protect the operator. When flush cutting stumps with a chain saw, all persons assisting the sawyer shall wear the same level of PPE that is required of the sawyer.

31.E.04 Cabling.

- a. Branches that are to be cabled shall be brought together to the proper distance by means of a block and tackle, a hand winch, a rope, or a rope with a come-along.
- b. No more than two persons shall be in a tree working at opposite ends during cabling installation.
- c. When the block and tackle are released, workers in trees shall be positioned off to one side in order to avoid injury in case the lag hooks pull out under the strain.
- d. Ground men shall not stand under the tree when cable is being installed.

31.E.05 Topping/Lowering Limbs.

- a. Workers performing topping operations shall ensure the trees can stand the strain of a topping procedures; if not, some other means of lowering the branches shall be used.
- b. If large limbs are lowered in sections, the worker in the tree shall be above the limb being lowered.

31.E.06 Trucks.

- a. A steel bulkhead or equivalent protection shall be provided to protect the occupants of vehicles from load shifts.

EM 385-1-1
15 Sep 08

- b. Logs or brush shall be securely loaded onto trucks in such a manner as not to obscure taillights or brake lights and vision, or to overhang the side.
- c. In order to avoid the hazard of spontaneous combustion or the production of undesirable products, wood chips shall not be left in trucks for extended periods.

31.E.07 Power saws.

- a. Power saws weighting more than 15 lbs (6.8 kg) shall be supported by a separate line, except when used from an aerial lift device or on the ground.
- b. Where there are no lateral branches on which to crotch a separate support line for power saws weighing more than 15 lb (6.8 kg), a false crotch shall be used.
- c. Use of hydraulic power saws is permissible.
- d. Climbers shall use a saw lanyard to carry the saw.
- e. The engine shall be started and operated only when all co-workers are clear of the saw and then in accordance with the manufacturer's recommendations and instructions.
- f. The operator will shut off the saw when carrying it over slippery surfaces, through heavy brush, and when adjacent to personnel. The saw may be carried running (idle speed with the brake set) for a short distances (less than 50 ft (15.2 m)) as long as it is carried to prevent contact with the chain or muffler.
- g. All saws shall be equipped with a clutch, chain brake (gas only), throttle trigger latch, stop switch, rear hand guard, chain catcher, vibration damper, spark arrestor, and muffler.
- h. Chain saws shall be kept sharp and operated per Section 13.F.

i. Proper PPE for chain saw use includes, eye protection, chaps, safety boots, hearing protection, and head protection. Hearing protection may not be needed on hydraulic saws.

j. Saws shall be equipped with a control that will return the saw to idling speed when released.

k. A power saw may not be operating while a climber is climbing up in the tree.

31.E.08 Chopping tools.

a. Chopping tools that have loose or cracked heads or splintered handles shall not be used.

b. Chopping tools shall never be used while working aloft.

c. Chopping tools shall be swung away from the feet, legs, and body, using the minimum power practical for control.

d. Chopping tools shall not be driven as wedges or used to drive metal wedges.

e. All edged tools and blades shall be properly sheathed when not in use.

31.E.09 Cant hooks, cant dogs, tongs, and carrying bars.

a. Hooks shall be firmly set before applying pressure.

b. Workers shall be warned and shall be in the clear before logs are moved.

c. The points of hooks shall be at least 2 in (5 cm) long and shall be kept sharp.

d. Workers shall stand to the rear and uphill when rolling logs.

EM 385-1-1
15 Sep 08

31.E.10 Wedges and chisels.

- a. Wedges and chisels shall be properly pointed and tempered.
- b. Only wood, plastic, or soft metal wedges shall be used with power saws.
- c. Wood-handled chisels should be protected with a ferrule on the striking end.