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SAE standard	ISO standard	Subject
SAE J1040	ISO 3471–1	Performance Criteria for Rollover Protective Structures (ROPS) for Construction, Earthmoving, Forestry and Mining Machines.
SAE J397	ISO 3164	Deflection Limiting Volume—ROPS/FOPS Laboratory Evaluation.
SAE J231	ISO 3449	Minimum Performance Criteria for Falling Object Protective Structures (FOPS).
SAE J386	ISO 6683	Operator Restraint Systems for Off-Road Work Machines.
SAE J185	ISO 2897	Access Systems for Off-Road Machines.

[59 FR 51741, Oct. 12, 1994, as amended at 60 FR 7449, Feb. 8, 1995; 60 FR 40458, Aug. 9, 1996; 60 FR 47035, Sept. 8, 1995; 61 FR 9241, 9242, Mar. 7, 1996; 69 FR 18803, Apr. 9, 2004; 71 FR 16673, Apr. 3, 2006; 79 FR 37190, July 1, 2014]

§ 1910.268 Telecommunications.

(a) *Application.* (1) This section sets forth safety and health standards that apply to the work conditions, practices, means, methods, operations, installations and processes performed at telecommunications centers and at telecommunications field installations, which are located outdoors or in building spaces used for such field installations. *Center* work includes the installation, operation, maintenance, rearrangement, and removal of communications equipment and other associated equipment in telecommunications switching centers. *Field* work includes the installation, operation, maintenance, rearrangement, and removal of conductors and other equipment used for signal or communication service, and of their supporting or containing structures, overhead or underground, on public or private rights of way, including buildings or other structures.

(2) These standards do not apply: (i) To construction work, as defined in § 1910.12, nor (ii) to installations under the exclusive control of electric utilities used for the purpose of communications or metering, or for generation, control, transformation, transmission, and distribution of electric energy, which are located in buildings used exclusively by the electric utilities for such purposes, or located outdoors on property owned or leased by the electric utilities or on public highways, streets, roads, etc., or outdoors by established rights on private property.

(3) Operations or conditions not specifically covered by this section are subject to all the applicable standards contained in this part 1910. See § 1910.5(c). Operations which involve construction work, as defined in

§ 1910.12 are subject to all the applicable standards contained in part 1926 of this chapter.

(b) *General*—(1) *Buildings containing telecommunications centers*—(i) *Illumination.* Lighting in telecommunication centers shall be provided in an adequate amount such that continuing work operations, routine observations, and the passage of employees can be carried out in a safe and healthful manner. Certain specific tasks in centers, such as splicing cable and the maintenance and repair of equipment frame lineups, may require a higher level of illumination. In such cases, the employer shall install permanent lighting or portable supplemental lighting to attain a higher level of illumination shall be provided as needed to permit safe performance of the required task.

(ii) *Working surfaces.* Guard rails and toe boards may be omitted on distribution frame mezzanine platforms to permit access to equipment. This exemption applies only on the side or sides of the platform facing the frames and only on those portions of the platform adjacent to equipped frames.

(iii) *Working spaces.* Maintenance aisles, or wiring aisles, between equipment frame lineups are working spaces and are not an exit route for purposes of 29 CFR 1910.34.

(iv) *Special doors.* When blastproof or power actuated doors are installed in specially designed hard-site security buildings and spaces, they shall be designed and installed so that they can be used as a means of egress in emergencies.

(v) *Equipment, machinery and machine guarding.* When power plant machinery in telecommunications centers is operated with commutators and couplings uncovered, the adjacent housing shall

be clearly marked to alert personnel to the rotating machinery.

(2) *Battery handling.* (i) Eye protection devices which provide side as well as frontal eye protection for employees shall be provided when measuring storage battery specific gravity or handling electrolyte, and the employer shall ensure that such devices are used by the employees. The employer shall also ensure that acid resistant gloves and aprons shall be worn for protection against spattering. Facilities for quick drenching or flushing of the eyes and body shall be provided unless the storage batteries are of the enclosed type and equipped with explosion proof vents, in which case sealed water rinse or neutralizing packs may be substituted for the quick drenching or flushing facilities. Employees assigned to work with storage batteries shall be instructed in emergency procedures such as dealing with accidental acid spills.

(ii) Electrolyte (acid or base, and distilled water) for battery cells shall be mixed in a well ventilated room. Acid or base shall be poured gradually, while stirring, into the water. Water shall never be poured into concentrated (greater than 75 percent) acid solutions. Electrolyte shall never be placed in metal containers nor stirred with metal objects.

(iii) When taking specific gravity readings, the open end of the hydrometer shall be covered with an acid resistant material while moving it from cell to cell to avoid splashing or throwing the electrolyte.

(3) Employers must provide employees with readily accessible, adequate, and appropriate first aid supplies. A non-mandatory example of appropriate supplies is listed in appendix A to 29 CFR 1910.151.

(4) *Hazardous materials.* Highway mobile vehicles and trailers stored in garages in accordance with §1910.110 may be equipped to carry more than one LP-gas container, but the total capacity of LP-gas containers per work vehicle stored in garages shall not exceed 100 pounds of LP-gas. All container valves shall be closed when not in use.

(5) *Compressed gas.* When using or transporting nitrogen cylinders in a horizontal position, special compart-

ments, racks, or adequate blocking shall be provided to prevent cylinder movement. Regulators shall be removed or guarded before a cylinder is transported.

(6) *Support structures.* No employee, or any material or equipment, may be supported or permitted to be supported on any portion of a pole structure, platform, ladder, walkway or other elevated structure or aerial device unless the employer ensures that the support structure is first inspected by a competent person and it is determined to be adequately strong, in good working condition and properly secured in place.

(7) *Approach distances to energized overhead power lines and parts.* The employer shall ensure that no employee approaches or takes any conductive object closer to any electrically energized overhead power lines and parts than prescribed in Table R-2, unless:

(i) The employee is insulated or guarded from the energized parts (insulating gloves rated for the voltage involved shall be considered adequate insulation), or

(ii) The energized parts are insulated or guarded from the employee and any other conductive object at a different potential, or

(iii) The power conductors and equipment are deenergized and grounded.

TABLE R-2—APPROACH DISTANCES TO EXPOSED ENERGIZED OVERHEAD POWER LINES AND PARTS

Voltage range (phase to phase, RMS)	Approach distance (inches)
300 V and less	(1)
Over 300V, not over 750V	12
Over 750V not over 2 kV	18
Over 2 kV, not over 15 kV	24
Over 15 kV, not over 37 kV	36
Over 37 kV, not over 87.5 kV	42
Over 87.5 kV, not over 121 kV	48
Over 121 kV, not over 140 kV	54

¹ Avoid contact.

(8) *Illumination of field work.* Whenever natural light is insufficient to adequately illuminate the worksite, artificial illumination shall be provided to enable the employee to perform the work safely.

(c) *Training.* Employers shall provide training in the various precautions and

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safe practices described in this section and shall insure that employees do not engage in the activities to which this section applies until such employees have received proper training in the various precautions and safe practices required by this section. However, where the employer can demonstrate that an employee is already trained in the precautions and safe practices required by this section prior to his employment, training need not be provided to that employee in accordance with this section. Where training is required, it shall consist of on-the-job training or classroom-type training or a combination of both. The employer shall certify that employees have been trained by preparing a certification record which includes the identity of the person trained, the signature of the employer or the person who conducted the training, and the date the training was completed. The certification record shall be prepared at the completion of training and shall be maintained on file for the duration of the employee's employment. The certification record shall be made available upon request to the Assistant Secretary for Occupational Safety and Health. Such training shall, where appropriate, include the following subjects:

(1) Recognition and avoidance of dangers relating to encounters with harmful substances and animal, insect, or plant life;

(2) Procedures to be followed in emergency situations; and,

(3) First aid training, including instruction in artificial respiration.

(d) *Employee protection in public work areas.* (1) Before work is begun in the vicinity of vehicular or pedestrian traffic which may endanger employees, warning signs and/or flags or other traffic control devices shall be placed conspicuously to alert and channel approaching traffic. Where further protection is needed, barriers shall be utilized. At night, warning lights shall be prominently displayed, and excavated areas shall be enclosed with protective barricades.

(2) If work exposes energized or moving parts that are normally protected, danger signs shall be displayed and bar-

ricades erected, as necessary, to warn other personnel in the area.

(3) The employer shall insure that an employee finding any crossed or fallen wires which create or may create a hazardous situation at the work area: (i) Remains on guard or adopts other adequate means to warn other employees of the danger and (ii) has the proper authority notified at the earliest practical moment.

(e) *Tools and personal protective equipment—Generally.* Personal protective equipment, protective devices and special tools needed for the work of employees shall be provided and the employer shall ensure that they are used by employees. Before each day's use the employer shall ensure that these personal protective devices, tools, and equipment are carefully inspected by a competent person to ascertain that they are in good condition.

(f) *Rubber insulating equipment.* (1) Rubber insulating equipment designed for the voltage levels to be encountered shall be provided and the employer shall ensure that they are used by employees as required by this section. The requirements of §1910.137, Electrical Protective Equipment, shall be followed except for Table I-6.

(2) The employer is responsible for the periodic retesting of all insulating gloves, blankets, and other rubber insulating equipment. This retesting shall be electrical, visual and mechanical. The following maximum retesting intervals shall apply:

Gloves, blankets, and other insulating equipment	Natural rubber	Synthetic rubber
	Months	
New	12	18
Re-issued	9	15

(3) Gloves and blankets shall be marked to indicate compliance with the retest schedule, and shall be marked with the date the next test is due. Gloves found to be defective in the field or by the tests set forth in paragraph (f)(2) of this section shall be destroyed by cutting them open from the finger to the gauntlet.

(g) *Personal climbing equipment—(1) General.* A positioning system or a personal fall arrest system shall be provided and the employer shall ensure

their use when work is performed at positions more than 4 feet (1.2 m) above the ground, on poles, and on towers, except as provided in paragraphs (n)(7) and (8) of this section. These systems shall meet the applicable requirements in subpart I of this part. The employer shall ensure that all climbing equipment is inspected before each day's use to determine that it is in safe working condition.

(2) *Pole climbers.* (i) Pole climbers may not be used if the gaffs are less than 1¼ inches in length as measured on the underside of the gaff. The gaffs of pole climbers shall be covered with safety caps when not being used for their intended use.

(ii) The employer shall ensure that pole climbers are inspected by a competent person for the following conditions: Fractured or cracked gaffs or leg irons, loose or dull gaffs, broken straps or buckles. If any of these conditions exist, the defect shall be corrected before the climbers are used.

(iii) Pole climbers shall be inspected as required in this paragraph (g)(3) before each day's use and a gaff cut-out test performed at least weekly when in use.

(iv) Pole climbers may not be worn when:

(A) Working in trees (specifically designed tree climbers shall be used for tree climbing),

(B) Working on ladders,

(C) Working in an aerial lift,

(D) Driving a vehicle, nor

(E) Walking on rocky, hard, frozen, brushy or hilly terrain.

(h) *Ladders.* Ladders, step bolts, and manhole steps shall meet the applicable requirements in subpart D of this part.

(i) *Other tools and personal protective equipment—(1) Head protection.* Head protection meeting the requirements of ANSI Z89.2-1971, "Safety Requirements for Industrial Protective Helmets for Electrical Workers, Class B" shall be provided whenever there is exposure to possible high voltage electrical contact, and the employer shall ensure that the head protection is used by employees. ANSI Z89.2-1971 is incorporated by reference as specified in § 1910.6.

(2) *Eye protection.* Eye protection meeting the requirements of § 1910.133 (a)(2) thru (a)(6) shall be provided and the employer shall ensure its use by employees where foreign objects may enter the eyes due to work operations such as but not limited to:

(i) Drilling or chipping stone, brick or masonry, breaking concrete or pavement, etc. by hand tools (sledgehammer, etc.) or power tools such as pneumatic drills or hammers;

(ii) Working on or around high speed emery or other grinding wheels unprotected by guards;

(iii) Cutting or chipping terra cotta ducts, tile, etc.;

(iv) Working under motor vehicles requiring hammering;

(v) Cleaning operations using compressed air, steam, or sand blast;

(vi) Acetylene welding or similar operations where sparks are thrown off;

(vii) Using powder actuated stud drivers;

(viii) Tree pruning or cutting underbrush;

(ix) Handling battery cells and solutions, such as taking battery readings with a hydrometer and thermometer;

(x) Removing or rearranging strand or open wire; and

(xi) Performing lead sleeve wiping and while soldering.

(3) *Tent heaters.* Flame-type heaters may not be used within ground tents or on platforms within aerial tents unless:

(i) The tent covers are constructed of fire resistant materials, and

(ii) Adequate ventilation is provided to maintain safe oxygen levels and avoid harmful buildup of combustion products and combustible gases.

(4) *Torches.* Torches may be used on aerial splicing platforms or in buckets enclosed by tents provided the tent material is constructed of fire resistant material and the torch is turned off when not in actual use. Aerial tents shall be adequately ventilated while the torch is in operation.

(5) *Portable power equipment.* Nominal 120V, or less, portable generators used for providing power at work locations do not require grounding if the output circuit is completely isolated from the frame of the unit.

(6) *Vehicle-mounted utility generators.* Vehicle-mounted utility generators

used for providing nominal 240V AC or less for powering portable tools and equipment need not be grounded to earth if all of the following conditions are met:

(i) One side of the voltage source is solidly strapped to the metallic structure of the vehicle;

(ii) Grounding-type outlets are used, with a “grounding” conductor between the outlet grounding terminal and the side of the voltage source that is strapped to the vehicle;

(iii) All metallic encased tools and equipment that are powered from this system are equipped with three-wire cords and grounding-type attachment plugs, except as designated in paragraph (i)(7) of this section.

(7) *Portable lights, tools, and appliances.* Portable lights, tools, and appliances having noncurrent-carrying external metal housing may be used with power equipment described in paragraph (i)(5) of this section without an equipment grounding conductor. When operated from commercial power such metal parts of these devices shall be grounded, unless these tools or appliances are protected by a system of double insulation, or its equivalent. Where such a system is employed, the equipment shall be distinctively marked to indicate double insulation.

(8) *Soldering devices.* Grounding shall be omitted when using soldering irons, guns or wire-wrap tools on telecommunications circuits.

(9) *Lead work.* The wiping of lead joints using melted solder, gas fueled torches, soldering irons or other appropriate heating devices, and the soldering of wires or other electrical connections do not constitute the welding, cutting and brazing described in subpart Q of this part. When operated from commercial power the metal housing of electric solder pots shall be grounded. Electric solder pots may be used with the power equipment described in paragraph (i)(5) of this section without a grounding conductor. The employer shall ensure that wiping gloves or cloths and eye protection are used in lead wiping operations. A drip pan to catch hot lead drippings shall also be provided and used.

(j) *Vehicle-mounted material handling devices and other mechanical equipment—*

(1) *General.* (i) The employer shall ensure that visual inspections are made of the equipment by a competent person each day the equipment is to be used to ascertain that it is in good condition.

(ii) The employer shall ensure that tests shall be made at the beginning of each shift by a competent person to insure the vehicle brakes and operating systems are in proper working condition.

(2) *Scrapers, loaders, dozers, graders and tractors.* (i) All rubber-tired, self-propelled scrapers, rubber-tired front end loaders, rubber-tired dozers, agricultural and industrial tractors, crawler tractors, crawler-type loaders, and motor graders, with or without attachments, that are used in telecommunications work shall have rollover protective structures that meet the requirements of subpart W of part 1926 of this Title.

(ii) Eye protection shall be provided and the employer shall ensure that it is used by employees when working in areas where flying material is generated.

(3) *Vehicle-mounted elevating and rotating work platforms.* These devices shall not be operated with any conductive part of the equipment closer to exposed energized power lines than the clearances set forth in Table R-2 of this section.

(4) *Derrick trucks and similar equipment.* (i) This equipment shall not be operated with any conductive part of the equipment closer to exposed energized power lines than the clearances set forth in Table R-2 of this section.

(ii) When derricks are used to handle poles near energized power conductors, these operations shall comply with the requirements contained in paragraphs (b)(7) and (n)(11) of this section.

(iii) Moving parts of equipment and machinery carried on or mounted on telecommunications line trucks shall be guarded. This may be done with barricades as specified in paragraph (d)(2) of this section.

(iv) Derricks and the operation of derricks shall comply with the following requirements: (A) Manufacturer’s specifications, load ratings and instructions for derrick operation shall be strictly observed.

(B) Rated load capacities and instructions related to derrick operation shall be conspicuously posted on a permanent weather-resistant plate or decal in a location on the derrick that is plainly visible to the derrick operator.

(C) Prior to derrick operation the parking brake must be set and the stabilizers extended if the vehicle is so equipped. When the vehicle is situated on a grade, at least two wheels must be chocked on the downgrade side.

(D) Only persons trained in the operation of the derrick shall be permitted to operate the derrick.

(E) Hand signals to derrick operators shall be those prescribed by ANSI B30.6-1969, "Safety Code for Derricks", which is incorporated by reference as specified in § 1910.6.

(F) The employer shall ensure that the derrick and its associated equipment are inspected by a competent person at intervals set by the manufacturer but in no case less than once per year. Records shall be maintained including the dates of inspections, and necessary repairs made, if corrective action was required.

(G) Modifications or additions to the derrick and its associated equipment that alter its capacity or affect its safe operation shall be made only with written certification from the manufacturer, or other equivalent entity, such as a nationally recognized testing laboratory, that the modification results in the equipment being safe for its intended use. Such changes shall require the changing and posting of revised capacity and instruction decals or plates. These new ratings or limitations shall be as provided by the manufacturer or other equivalent entity.

(H) Wire rope used with derricks shall be of improved plow steel or equivalent. Wire rope safety factors shall be in accordance with American National Standards Institute B30.6-1969.

(I) Wire rope shall be taken out of service, or the defective portion removed, when any of the following conditions exist: (1) The rope strength has been significantly reduced due to corrosion, pitting, or excessive heat, or

(2) The thickness of the outer wires of the rope has been reduced to two-

thirds or less of the original thickness, or

(3) There are more than six broken wires in any one rope lay, or

(4) There is excessive permanent distortion caused by kinking, crushing, or severe twisting of the rope.

(k) *Materials handling and storage*—(1) *Poles.* When working with poles in piles or stacks, work shall be performed from the ends of the poles as much as possible, and precautions shall be taken for the safety of employees at the other end of the pole. During pole hauling operations, all loads shall be secured to prevent displacement. Lights, reflectors and/or flags shall be displayed on the end and sides of the load as necessary. The requirements for installation, removal, or other handling of poles in pole lines are prescribed in paragraph (n) of this section which pertains to overhead lines. In the case of hoisting machinery equipped with a positive stop loadholding device, it shall be permissible for the operator to leave his position at the controls (while a load is suspended) for the sole purpose of assisting in positioning the load prior to landing it. Prior to unloading steel, poles, crossarms, and similar material, the load shall be thoroughly examined to ascertain that the load has not shifted, that binders or stakes have not broken, and that the load is not otherwise hazardous to employees.

(2) *Cable reels.* Cable reels in storage shall be checked or otherwise restrained when there is a possibility that they might accidentally roll from position.

(1) *Cable fault locating and testing.* (1) Employees involved in using high voltages to locate trouble or test cables shall be instructed in the precautions necessary for their own safety and the safety of other employees.

(2) Before the voltage is applied, cable conductors shall be isolated to the extent practicable. Employees shall be warned, by such techniques as briefing and tagging at all affected locations, to stay clear while the voltage is applied.

(m) *Grounding for employee protection—pole lines*—(1) *Power conductors.* Electric power conductors and equipment shall be considered as energized

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unless the employee can visually determine that they are bonded to one of the grounds listed in paragraph (m)(4) of this section.

(2) *Nonworking open wire.* Nonworking open wire communications lines shall be bonded to one of the grounds listed in paragraph (m)(4) of this section.

(3) *Vertical power conduit, power ground wires and street light fixtures.* (i) Metal power conduit on joint use poles, exposed vertical power ground wires, and street light fixtures which are below communications attachments or less than 20 inches above these attachments, shall be considered energized and shall be tested for voltage unless the employee can visually determine that they are bonded to the communications suspension strand or cable sheath.

(ii) If no hazardous voltage is shown by the voltage test, a temporary bond shall be placed between such street light fixture, exposed vertical power grounding conductor, or metallic power conduit and the communications cable strand. Temporary bonds used for this purpose shall have sufficient conductivity to carry at least 500 amperes for a period of one second without fusing.

(4) *Suitable protective grounding.* Acceptable grounds for protective grounding are as follows:

(i) A vertical ground wire which has been tested, found safe, and is connected to a power system multi-grounded neutral or the grounded neutral of a power secondary system where there are at least three services connected;

(ii) Communications cable sheath or shield and its supporting strand where the sheath or shield is:

(A) Bonded to an underground or buried cable which is connected to a central office ground, or

(B) Bonded to an underground metallic piping system, or

(C) Bonded to a power system multi-grounded neutral or grounded neutral of a power secondary system which has at least three services connected;

(iii) Guys which are bonded to the grounds specified in paragraphs (m)(4) (i) and (ii) of this section and which have continuity uninterrupted by an insulator; and

(iv) If all of the preceding grounds are not available, arrays of driven ground rods where the resultant resistance to ground will be low enough to eliminate danger to personnel or permit prompt operation of protective devices.

(5) *Attaching and removing temporary bonds.* When attaching grounds (bonds), the first attachment shall be made to the protective ground. When removing bonds, the connection to the line or equipment shall be removed first. Insulating gloves shall be worn during these operations.

(6) *Temporary grounding of suspension strand.* (i) The suspension strand shall be grounded to the existing grounds listed in paragraph (m)(4) of this section when being placed on jointly used poles or during thunderstorm activity.

(ii) Where power crossings are encountered on nonjoint lines, the strand shall be bonded to an existing ground listed in paragraph (m)(4) of this section as close as possible to the crossing. This bonding is not required where crossings are made on a common crossing pole unless there is an upward change in grade at the pole.

(iii) Where roller-type bonds are used, they shall be restrained so as to avoid stressing the electrical connections.

(iv) Bonds between the suspension strand and the existing ground shall be at least No. 6AWG copper.

(v) Temporary bonds shall be left in place until the strand has been tensioned, dead-ended, and permanently grounded.

(vi) The requirements of paragraphs (m)(6)(i) through (m)(6)(v) of this section do not apply to the installation of insulated strand.

(7) *Antenna work-radio transmitting stations 3-30 MHZ.* (i) Prior to grounding a radio transmitting station antenna, the employer shall insure that the rigger in charge:

(A) Prepares a danger tag signed with his signature,

(B) Requests the transmitting technician to shutdown the transmitter and to ground the antenna with its grounding switch,

(C) Is notified by the transmitting technician that the transmitter has been shutdown, and

(D) Tags the antenna ground switch personally in the presence of the transmitting technician after the antenna has been grounded by the transmitting technician.

(ii) Power shall not be applied to the antenna, nor shall the grounding switch be opened under any circumstances while the tag is affixed.

(iii)(A) Where no grounding switches are provided, grounding sticks shall be used, one on each side of line, and tags shall be placed on the grounding sticks, antenna switch, or plate power switch in a conspicuous place.

(B) When necessary to further reduce excessive radio frequency pickup, ground sticks or short circuits shall be placed directly on the transmission lines near the transmitter in addition to the regular grounding switches.

(C) In other cases, the antenna lines may be disconnected from ground and the transmitter to reduce pickup at the point in the field.

(iv) All radio frequency line wires shall be tested for pickup with an insulated probe before they are handled either with bare hands or with metal tools.

(v) The employer shall insure that the transmitting technician warn the riggers about adjacent lines which are, or may become energized.

(vi) The employer shall insure that when antenna work has been completed, the rigger in charge of the job returns to the transmitter, notifies the transmitting technician in charge that work has been completed, and personally removes the tag from the antenna ground switch.

(n) *Overhead lines*—(1) *Handling suspension strand.* (i) The employer shall insure that when handling cable suspension strand which is being installed on poles carrying exposed energized power conductors, employees shall wear insulating gloves and shall avoid body contact with the strand until after it has been tensioned, dead-ended and permanently grounded.

(ii) The strand shall be restrained against upward movement during installation:

(A) On joint-use poles, where there is an upward change in grade at the pole, and

(B) On non-joint-use poles, where the line crosses under energized power conductors.

(2) *Need for testing wood poles.* Unless temporary guys or braces are attached, the following poles shall be tested in accordance with paragraph (n)(3) of this section and determined to be safe before employees are permitted to climb them:

(i) Dead-end poles, except properly braced or guyed “Y” or “T” cable junction poles,

(ii) Straight line poles which are not storm guyed and where adjacent span lengths exceed 165 feet,

(iii) Poles at which there is a downward change in grade and which are not guyed or braced corner poles or cable junction poles,

(iv) Poles which support only telephone drop wire, and

(v) Poles which carry less than ten communication line wires. On joint use poles, one power line wire shall be considered as two communication wires for purposes of this paragraph (n)(2)(v).

(3) *Methods for testing wood poles.* One of the following methods or an equivalent method shall be used for testing wood poles:

(i) Rap the pole sharply with a hammer weighing about 3 pounds, starting near the ground line and continuing upwards circumferentially around the pole to a height of approximately 6 feet. The hammer will produce a clear sound and rebound sharply when striking sound wood. Decay pockets will be indicated by a dull sound and/or a less pronounced hammer rebound. When decay pockets are indicated, the pole shall be considered unsafe. Also, prod the pole as near the ground line as possible using a pole prod or a screwdriver with a blade at least 5 inches long. If substantial decay is encountered, the pole shall be considered unsafe.

(ii) Apply a horizontal force to the pole and attempt to rock it back and forth in a direction perpendicular to the line. Caution shall be exercised to avoid causing power wires to swing together. The force may be applied either by pushing with a pike pole or pulling with a rope. If the pole cracks during the test, it shall be considered unsafe.

(4) *Unsafe poles or structures.* Poles or structures determined to be unsafe by

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test or observation may not be climbed until made safe by guying, bracing or other adequate means. Poles determined to be unsafe to climb shall, until they are made safe, be tagged in a conspicuous place to alert and warn all employees of the unsafe condition.

(5) *Test requirements for cable suspension strand.* (i) Before attaching a splicing platform to a cable suspension strand, the strand shall be tested and determined to have strength sufficient to support the weight of the platform and the employee. Where the strand crosses above power wires or railroad tracks it may not be tested but shall be inspected in accordance with paragraph (n)(6) of this section.

(ii) The following method or an equivalent method shall be used for testing the strength of the strand: A rope, at least three-eighths inch in diameter, shall be thrown over the strand. On joint lines, the rope shall be passed over the strand using tree pruner handles or a wire raising tool. If two employees are present, both shall grip the double rope and slowly transfer their entire weight to the rope and attempt to raise themselves off the ground. If only one employee is present, one end of the rope which has been passed over the strand shall be tied to the bumper of the truck, or other equally secure anchorage. The employee then shall grasp the other end of the rope and attempt to raise himself off the ground.

(6) *Inspection of strand.* Where strand passes over electric power wires or railroad tracks, it shall be inspected from an elevated working position at each pole supporting the span in question. The strand may not be used to support any splicing platform, scaffold or cable car, if any of the following conditions exist:

- (i) Corrosion so that no galvanizing can be detected,
- (ii) One or more wires of the strand are broken,
- (iii) Worn spots, or
- (iv) Burn marks such as those caused by contact with electric power wires.

(7) *Outside work platforms.* Unless adequate railings are provided, safety straps and body belts shall be used while working on elevated work platforms such as aerial splicing platforms,

pole platforms, ladder platforms and terminal balconies.

(8) *Other elevated locations.* Safety straps and body belts shall be worn when working at elevated positions on poles, towers or similar structures, which do not have adequately guarded work areas.

(9) *Installing and removing wire and cable.* Before installing or removing wire or cable, the pole or structure shall be guyed, braced, or otherwise supported, as necessary, to prevent failure of the pole or structure.

(10) *Avoiding contact with energized power conductors or equipment.* When cranes, derricks, or other mechanized equipment are used for setting, moving, or removing poles, all necessary precautions shall be taken to avoid contact with energized power conductors or equipment.

(11) *Handling poles near energized power conductors.* (i) Joint use poles may not be set, moved, or removed where the nominal voltage of open electrical power conductors exceeds 34.5kV phase to phase (20kV to ground).

(ii) Poles that are to be placed, moved or removed during heavy rains, sleet or wet snow in joint lines carrying more than 8.7kV phase to phase voltage (5kV to ground) shall be guarded or otherwise prevented from direct contact with overhead energized power conductors.

(iii)(A) In joint lines where the power voltage is greater than 750 volts but less than 34.5kV phase to phase (20 kV to ground), wet poles being placed, moved or removed shall be insulated with either a rubber insulating blanket, a fiberglass box guide, or equivalent protective equipment.

(B) In joint lines where the power voltage is greater than 8.7 kV phase to phase (5kV to ground) but less than 34.5kV phase to phase (20 kV to ground), dry poles being placed, moved, or removed shall be insulated with either a rubber insulating blanket, a fiberglass box guide, or equivalent protective equipment.

(C) Where wet or dry poles are being removed, insulation of the pole is not required if the pole is cut off 2 feet or more below the lowest power wire and also cut off near the ground line.

(iv) Insulating gloves shall be worn when handling the pole with either hands or tools, when there exists a possibility that the pole may contact a power conductor. Where the voltage to ground of the power conductor exceeds 15kV to ground, Class II gloves (as defined in ANSI J6.6-1971) shall be used. For voltages not exceeding 15kV to ground, insulating gloves shall have a breakdown voltage of at least 17kV.

(v) The guard or insulating material used to protect the pole shall meet the appropriate 3 minute proof test voltage requirements contained in the ANSI J6.4-1971.

(vi) When there exists a possibility of contact between the pole or the vehicle-mounted equipment used to handle the pole, and an energized power conductor, the following precautions shall be observed:

(A) When on the vehicle which carries the derrick, avoid all contact with the ground, with persons standing on the ground, and with all grounded objects such as guys, tree limbs, or metal sign posts. To the extent feasible, remain on the vehicle as long as the possibility of contact exists.

(B) When it is necessary to leave the vehicle, step onto an insulating blanket and break all contact with the vehicle before stepping off the blanket and onto the ground. As a last resort, if a blanket is not available, the employee may jump cleanly from the vehicle.

(C) When it is necessary to enter the vehicle, first step onto an insulating blanket and break all contact with the ground, grounded objects and other persons before touching the truck or derrick.

(12) *Working position on poles.* Climbing and working are prohibited above the level of the lowest electric power conductor on the pole (exclusive of vertical runs and street light wiring), except:

(i) Where communications facilities are attached above the electric power conductors, and a rigid fixed barrier is installed between the electric power facility and the communications facility, or

(ii) Where the electric power conductors are cabled secondary service drops carrying less than 300 volts to ground

and are attached 40 inches or more below the communications conductors or cables.

(13) *Metal tapes and ropes.* (i) Metal measuring tapes, metal measuring ropes, or tapes containing conductive strands may not be used when working near exposed energized parts.

(ii) Where it is necessary to measure clearances from energized parts, only nonconductive devices shall be used.

(o) *Underground lines.* The provisions of this paragraph apply to the guarding of manholes and street openings, and to the ventilation and testing for gas in manholes and unvented vaults, where telecommunications field work is performed on or with underground lines.

(1) *Guarding manholes and street openings.* (i) When covers of manholes or vaults are removed, the opening shall be promptly guarded by a railing, temporary cover, or other suitable temporary barrier which is appropriate to prevent an accidental fall through the opening and to protect employees working in the manhole from foreign objects entering the manhole.

(ii) While work is being performed in the manhole, a person with basic first aid training shall be immediately available to render assistance if there is cause for believing that a safety hazard exists, and if the requirements contained in paragraphs (d)(1) and (o)(1)(i) of this section do not adequately protect the employee(s). Examples of manhole worksite hazards which shall be considered to constitute a safety hazard include, but are not limited to:

(A) Manhole worksites where safety hazards are created by traffic patterns that cannot be corrected by provisions of paragraph (d)(1) of this section.

(B) Manhole worksites that are subject to unusual water hazards that cannot be abated by conventional means.

(C) Manhole worksites that are occupied jointly with power utilities as described in paragraph (o)(3) of this section.

(2) *Requirements prior to entering manholes and unvented vaults.* (i) Before an employee enters a manhole, the following steps shall be taken:

(A) The internal atmosphere shall be tested for combustible gas and, except when continuous forced ventilation is

provided, the atmosphere shall also be tested for oxygen deficiency.

(B) When unsafe conditions are detected by testing or other means, the work area shall be ventilated and otherwise made safe before entry.

(ii) An adequate continuous supply of air shall be provided while work is performed in manholes under any of the following conditions:

(A) Where combustible or explosive gas vapors have been initially detected and subsequently reduced to a safe level by ventilation,

(B) Where organic solvents are used in the work procedure,

(C) Where open flame torches are used in the work procedure,

(D) Where the manhole is located in that portion of a public right of way open to vehicular traffic and/or exposed to a seepage of gas or gases, or

(E) Where a toxic gas or oxygen deficiency is found.

(iii)(A) The requirements of paragraphs (o)(2) (i) and (ii) of this section do not apply to work in central office cable vaults that are adequately ventilated.

(B) The requirements of paragraphs (o)(2) (i) and (ii) of this section apply to work in unvented vaults.

(3) *Joint power and telecommunication manholes.* While work is being performed in a manhole occupied jointly by an electric utility and a telecommunication utility, an employee with basic first aid training shall be available in the immediate vicinity to render emergency assistance as may be required. The employee whose presence is required in the immediate vicinity for the purposes of rendering emergency assistance is not to be precluded from occasionally entering a manhole to provide assistance other than in an emergency. The requirement of this paragraph (o)(3) does not preclude a qualified employee, working alone, from entering for brief periods of time, a manhole where energized cables or equipment are in service, for the purpose of inspection, housekeeping, taking readings, or similar work if such work can be performed safely.

(4) *Ladders.* Ladders shall be used to enter and exit manholes exceeding 4 feet in depth.

(5) *Flames.* When open flames are used in manholes, the following precautions shall be taken to protect against the accumulation of combustible gas:

(i) A test for combustible gas shall be made immediately before using the open flame device, and at least once per hour while using the device; and

(ii) a fuel tank (e.g., acetylene) may not be in the manhole unless in actual use.

(p) *Microwave transmission—(1) Eye protection.* Employers shall insure that employees do not look into an open waveguide which is connected to an energized source of microwave radiation.

(2) *Hazardous area.* Accessible areas associated with microwave communication systems where the electromagnetic radiation level exceeds the radiation protection guide given in §1910.97 shall be posted as described in that section. The lower half of the warning symbol shall include the following:

Radiation in this area may exceed hazard limitations and special precautions are required. Obtain specific instruction before entering.

(3) *Protective measures.* When an employee works in an area where the electromagnetic radiation exceeds the radiation protection guide, the employer shall institute measures that insure that the employee's exposure is not greater than that permitted by the radiation guide. Such measures shall include, but not be limited to those of an administrative or engineering nature or those involving personal protective equipment.

(q) *Tree trimming—electrical hazards—(1) General.* (i) Employees engaged in pruning, trimming, removing, or clearing trees from lines shall be required to consider all overhead and underground electrical power conductors to be energized with potentially fatal voltages, never to be touched (contacted) either directly or indirectly.

(ii) Employees engaged in line-clearing operations shall be instructed that:

(A) A direct contact is made when any part of the body touches or contacts an energized conductor, or other energized electrical fixture or apparatus.

(B) An indirect contact is made when any part of the body touches any object in contact with an energized electrical conductor, or other energized fixture or apparatus.

(C) An indirect contact can be made through conductive tools, tree branches, trucks, equipment, or other objects, or as a result of communications wires, cables, fences, or guy wires being accidentally energized.

(D) Electric shock will occur when an employee, by either direct or indirect contact with an energized conductor, energized tree limb, tool, equipment, or other object, provides a path for the flow of electricity to a grounded object or to the ground itself. Simultaneous contact with two energized conductors will also cause electric shock which may result in serious or fatal injury.

(iii) Before any work is performed in proximity to energized conductors, the system operator/owner of the energized conductors shall be contacted to ascertain if he knows of any hazards associated with the conductors which may not be readily apparent. This rule does not apply when operations are performed by or on behalf of, the system operator/owner.

(2) *Working in proximity to electrical hazards.* (i) Employers shall ensure that a close inspection is made by the employee and by the foremen or supervisor in charge before climbing, entering, or working around any tree, to determine whether an electrical power conductor passes through the tree, or passes within reaching distance of an employee working in the tree. If any of these conditions exist either directly or indirectly, an electrical hazard shall be considered to exist unless the system operator/owner has caused the hazard to be removed by deenergizing the lines, or installing protective equipment.

(ii) Only qualified employees or trainees, familiar with the special techniques and hazards involved in line clearance, shall be permitted to perform the work if it is found that an electrical hazard exists.

(iii) During all tree working operations aloft where an electrical hazard of more than 750V exists, there shall be a second employee or trainee qualified

in line clearance tree trimming within normal voice communication.

(iv) Where tree work is performed by employees qualified in line-clearance tree trimming and trainees qualified in line-clearance tree trimming, the clearances from energized conductors given in Table R-3 shall apply.

TABLE R-3—MINIMUM WORKING DISTANCES FROM ENERGIZED CONDUCTORS FOR LINE-CLEARANCE TREE TRIMMERS AND LINE-CLEARANCE TREE-TRIMMER TRAINEES

Voltage range (phase to phase) (kilovolts)	Minimum working distance
2.1 to 15.0	2 ft. 0 in.
15.1 to 35.0	2 ft. 4 in.
35.1 to 46.0	2 ft. 6 in.
46.1 to 72.5	3 ft. 0 in.
72.6 to 121.0	3 ft. 4 in.
138.0 to 145.0	3 ft. 6 in.
161.0 to 169.0	3 ft. 8 in.
230.0 to 242.0	5 ft. 0 in.
345.0 to 362.0	7 ft. 0 in.
500.0 to 552.0	11 ft. 0 in.
700.0 to 765.0	15 ft. 0 in.

(v) Branches hanging on an energized conductor may only be removed using appropriately insulated equipment.

(vi) Rubber footwear, including lineman's overshoes, shall not be considered as providing any measure of safety from electrical hazards.

(vii) Ladders, platforms, and aerial devices, including insulated aerial devices, may not be brought in contact with an electrical conductor. Reliance shall not be placed on their dielectric capabilities.

(viii) When an aerial lift device contacts an electrical conductor, the truck supporting the aerial lift device shall be considered as energized.

(3) *Storm work and emergency conditions.* (i) Since storm work and emergency conditions create special hazards, only authorized representatives of the electric utility system operator/owner and not telecommunication workers may perform tree work in these situations where energized electrical power conductors are involved.

(ii) When an emergency condition develops due to tree operations, work shall be suspended and the system operator/owner shall be notified immediately.

(r) *Buried facilities—Communications lines and power lines in the same trench.* [Reserved]

(s) *Definitions—(1) Aerial lifts.* Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to jobsites above ground:

- (i) Extensible boom platforms,
- (ii) Aerial ladders,
- (iii) Articulating boom platforms,
- (iv) Vertical towers,

(v) A combination of any of the above defined in ANSI A92.2-1969, which is incorporated by reference as specified in §1910.6. These devices are made of metal, wood, fiberglass reinforced plastic (FRP), or other material; are powered or manually operated; and are deemed to be aerial lifts whether or not they are capable of rotating about a substantially vertical axis.

(2) *Aerial splicing platform.* This consists of a platform, approximately 3 ft. × 4 ft., used to perform aerial cable work. It is furnished with fiber or synthetic ropes for supporting the platform from aerial strand, detachable guy ropes for anchoring it, and a device for raising and lowering it with a handline.

(3) *Aerial tent.* A small tent usually constructed of vinyl coated canvas which is usually supported by light metal or plastic tubing. It is designed to protect employees in inclement weather while working on ladders, aerial splicing platforms, or aerial devices.

(4) *Alive or live (energized).* Electrically connected to a source of potential difference, or electrically charged so as to have a potential significantly different from that of the earth in the vicinity. The term *live* is sometimes used in the place of the term *current-carrying*, where the intent is clear, to avoid repetition of the longer term.

(5) *Barricade.* A physical obstruction such as tapes, cones, or “A” frame type wood and/or metal structure intended to warn and limit access to a work area.

(6) *Barrier.* A physical obstruction which is intended to prevent contact with energized lines or equipment, or to prevent unauthorized access to work area.

(7) *Bond.* An electrical connection from one conductive element to another for the purpose of minimizing potential differences or providing suitable conductivity for fault current or for mitigation of leakage current and electrolytic action.

(8) *Cable.* A conductor with insulation, or a stranded conductor with or without insulation and other coverings (single-conductor cable), or a combination of conductors insulated from one another (multiple-conductor cable).

(9) *Cable sheath.* A protective covering applied to cables.

NOTE: A cable sheath may consist of multiple layers of which one or more is conductive.

(10) *Circuit.* A conductor or system of conductors through which an electric current is intended to flow.

(11) *Communication lines.* The conductors and their supporting or containing structures for telephone, telegraph, railroad signal, data, clock, fire, police-alarm, community television antenna and other systems which are used for public or private signal or communication service, and which operate at potentials not exceeding 400 volts to ground or 750 volts between any two points of the circuit, and the transmitted power of which does not exceed 150 watts. When communications lines operate at less than 150 volts to ground, no limit is placed on the capacity of the system. Specifically designed communications cables may include communication circuits not complying with the preceding limitations, where such circuits are also used incidentally to supply power to communication equipment.

(12) *Conductor.* A material, usually in the form of a wire, cable, or bus bar, suitable for carrying an electric current.

(13) *Effectively grounded.* Intentionally connected to earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent the build-up of voltages which may result in undue hazard to connected equipment or to persons.

(14) *Equipment.* A general term which includes materials, fittings, devices, appliances, fixtures, apparatus, and

similar items used as part of, or in connection with, a supply or communications installation.

(15) *Ground (reference)*. That conductive body, usually earth, to which an electric potential is referenced.

(16) *Ground (as a noun)*. A conductive connection, whether intentional or accidental, by which an electric circuit or equipment is connected to reference ground.

(17) *Ground (as a verb)*. The connecting or establishment of a connection, whether by intention or accident, of an electric circuit or equipment to reference ground.

(18) *Ground tent*. A small tent usually constructed of vinyl coated canvas supported by a metal or plastic frame. Its purpose is to protect employees from inclement weather while working at buried cable pedestal sites or similar locations.

(19) *Grounded conductor*. A system or circuit conductor which is intentionally grounded.

(20) *Grounded systems*. A system of conductors in which at least one conductor or point (usually the middle wire, or the neutral point of transformer or generator windings) is intentionally grounded, either solidly or through a current-limiting device (not a current-interrupting device).

(21) *Grounding electrode conductor (Grounding conductor)*. A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode.

(22) *Insulated*. Separated from other conducting surfaces by a dielectric substance (including air space) offering a high resistance to the passage of current.

NOTE: When any object is said to be insulated, it is understood to be insulated in suitable manner for the conditions to which it is subjected. Otherwise, it is, within the purpose of these rules, uninsulated. Insulating coverings of conductors in one means of making the conductor insulated.

(23) *Insulation (as applied to cable)*. That which is relied upon to insulate the conductor from other conductors or conducting parts or from ground.

(24) *Joint use*. The sharing of a common facility, such as a manhole, trench or pole, by two or more different kinds

of utilities (e.g., power and telecommunications).

(25) *Ladder platform*. A device designed to facilitate working aloft from an extension ladder. A typical device consists of a platform (approximately 9" x 18") hinged to a welded pipe frame. The rear edge of the platform and the bottom cross-member of the frame are equipped with latches to lock the platform to ladder rungs.

(26) *Ladder seat*. A removable seat used to facilitate work at an elevated position on rolling ladders in telecommunication centers.

(27) *Manhole*. A subsurface enclosure which personnel may enter and which is used for the purpose of installing, operating, and maintaining submersible equipment and/or cable.

(28) *Manhole platform*. A platform consisting of separate planks which are laid across steel platform supports. The ends of the supports are engaged in the manhole cable racks.

(29) *Microwave transmission*. The act of communicating or signaling utilizing a frequency between 1 GHz_z (gigahertz) and 300 GHz_z inclusively.

(30) *Nominal voltage*. The nominal voltage of a system or circuit is the value assigned to a system or circuit of a given voltage class for the purpose of convenient designation. The actual voltage may vary above or below this value.

(31) *Pole balcony or seat*. A balcony or seat used as a support for workmen at pole-mounted equipment or terminal boxes. A typical device consists of a bolted assembly of steel details and a wooden platform. Steel braces run from the pole to the underside of the balcony. A guard rail (approximately 30" high) may be provided.

(32) *Pole platform*. A platform intended for use by a workman in splicing and maintenance operations in an elevated position adjacent to a pole. It consists of a platform equipped at one end with a hinged chain binder for securing the platform to a pole. A brace from the pole to the underside of the platform is also provided.

(33) *Qualified employee*. Any worker who by reason of his training and experience has demonstrated his ability to safely perform his duties.

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(34) *Qualified line-clearance tree trimmer.* A tree worker who through related training and on-the-job experience is familiar with the special techniques and hazards involved in line clearance.

(35) *Qualified line-clearance tree-trimmer trainee.* Any worker regularly assigned to a line-clearance tree-trimming crew and undergoing on-the-job training who, in the course of such training, has demonstrated his ability to perform his duties safely at his level of training.

(36) *System operator/owner.* The person or organization that operates or controls the electrical conductors involved.

(37) *Telecommunications center.* An installation of communication equipment under the exclusive control of an organization providing telecommunications service, that is located outdoors or in a vault, chamber, or a building space used primarily for such installations.

NOTE: Telecommunication centers are facilities established, equipped and arranged in accordance with engineered plans for the purpose of providing telecommunications service. They may be located on premises owned or leased by the organization providing telecommunication service, or on the premises owned or leased by others. This definition includes switch rooms (whether electromechanical, electronic, or computer controlled), terminal rooms, power rooms, repeater rooms, transmitter and receiver rooms, switchboard operating rooms, cable vaults, and miscellaneous communications equipment rooms. Simulation rooms of telecommunication centers for training or developmental purposes are also included.

(38) *Telecommunications derricks.* Rotating or nonrotating derrick structures permanently mounted on vehicles for the purpose of lifting, lowering, or positioning hardware and materials used in telecommunications work.

(39) *Telecommunication line truck.* A truck used to transport men, tools, and material, and to serve as a traveling workshop for telecommunication installation and maintenance work. It is sometimes equipped with a boom and auxiliary equipment for setting poles, digging holes, and elevating material or men.

(40) *Telecommunication service.* The furnishing of a capability to signal or communicate at a distance by means

such as telephone, telegraph, police and firealarm, community antenna television, or similar system, using wire, conventional cable, coaxial cable, wave guides, microwave transmission, or other similar means.

(41) *Unvented vault.* An enclosed vault in which the only openings are access openings.

(42) *Vault.* An enclosure above or below ground which personnel may enter, and which is used for the purpose of installing, operating, and/or maintaining equipment and/or cable which need not be of submersible design.

(43) *Vented vault.* An enclosure as described in paragraph(s) (42) of this section, with provision for air changes using exhaust flue stack(s) and low level air intake(s), operating on differentials of pressure and temperature providing for air flow.

(44) *Voltage of an effectively grounded circuit.* The voltage between any conductor and ground unless otherwise indicated.

(45) *Voltage of a circuit not effectively grounded.* The voltage between any two conductors. If one circuit is directly connected to and supplied from another circuit of higher voltage (as in the case of an autotransformer), both are considered as of the higher voltage, unless the circuit of lower voltage is effectively grounded, in which case its voltage is not determined by the circuit of higher voltage. Direct connection implies electric connection as distinguished from connection merely through electromagnetic or electrostatic induction.

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§ 1910.269 Electric power generation, transmission, and distribution.

(a) *General—(1) Application.* (i) This section covers the operation and maintenance of electric power generation, control, transformation, transmission, and distribution lines and equipment. These provisions apply to: