

(ii) A listed primary protector shall be also provided on each aerial or underground circuit when the location of the circuit within the block containing the building served allows the circuit to be exposed to accidental contact with electric light or power conductors operating at over 300 volts to ground.

(iii) In addition, where there exists a lightning exposure, each interbuilding circuit on premises shall be protected by a listed primary protector at each end of the interbuilding circuit.

(2) *Conductor location.* (i) Lead-in or aerial-drop cables from a pole or other support, including the point of initial attachment to a building or structure, shall be kept away from electric light, power, Class 1, or nonpower-limited fire alarm circuit conductors so as to avoid the possibility of accidental contact.

(ii) A separation of at least 1.83 m (6 ft) shall be maintained between communications wires and cables on buildings and lightning conductors.

(iii) Where communications wires and cables and electric light or power conductors are supported by the same pole or run parallel to each other in-span, the following conditions shall be met:

(A) Where practicable, communication wires and cables on poles shall be located below the electric light or power conductors; and

(B) Communications wires and cables may not be attached to a crossarm that carries electric light or power conductors.

(iv) Indoor communications wires and cables shall be separated at least 50.8 mm (2 in.) from conductors of any electric light, power, Class 1, nonpower-limited fire alarm, or medium power network-powered broadband communications circuits, unless a special and equally protective method of conductor separation, identified for the purpose, is employed.

(3) *Equipment location.* Outdoor metal structures supporting antennas, as well as self-supporting antennas such as vertical rods or dipole structures, shall be located as far away from overhead conductors of electric light and power circuits of over 150 volts to ground as necessary to prevent the antenna or structure from falling into or making accidental contact with such circuits.

(4) *Grounding.* (i) If exposed to contact with electric light and power conductors, the metal sheath of aerial cables entering buildings shall be grounded or shall be interrupted close to the entrance to the building by an insulating joint or equivalent device. Where protective devices are used, they shall be grounded in an approved manner.

(ii) Masts and metal structures supporting antennas shall be permanently and effectively grounded without splice or connection in the grounding conductor.

(iii) Transmitters shall be enclosed in a metal frame or grill or separated from the operating space by a barrier, all metallic parts of which are effectively connected to ground. All external metal handles and controls accessible to the operating personnel shall be effectively grounded. Unpowered equipment and enclosures are considered to be grounded where connected to an attached coaxial cable with an effectively grounded metallic shield.

(f) *Solar photovoltaic systems.* This paragraph covers solar photovoltaic systems that can be interactive with other electric power production sources or can stand alone with or without electrical energy storage such as batteries. These systems may have ac or dc output for utilization.

(1) *Conductors of different systems.* Photovoltaic source circuits and photovoltaic output circuits may not be contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as feeders or branch circuits of other systems, unless the conductors of the different systems are separated by a partition or are connected together.

(2) *Disconnecting means.* Means shall be provided to disconnect all current-carrying conductors of a photovoltaic power source from all other conductors in a building or other structure. Where a circuit grounding connection is not designed to be automatically interrupted as part of the ground-fault protection system, a switch or circuit breaker used as disconnecting means may not have a pole in the grounded conductor.

(g) *Integrated electrical systems—(1) Scope.* Paragraph (g) of this section

covers integrated electrical systems, other than unit equipment, in which orderly shutdown is necessary to ensure safe operation. An integrated electrical system as used in this section shall be a unitized segment of an industrial wiring system where all of the following conditions are met:

- (i) An orderly shutdown process minimizes employee hazard and equipment damage;
- (ii) The conditions of maintenance and supervision ensure that only qualified persons will service the system; and
- (iii) Effective safeguards are established and maintained.

(2) *Location of overcurrent devices in or on premises.* Overcurrent devices that are critical to integrated electrical systems need not be readily accessible to employees as required by §1910.304(f)(1)(iv) if they are located with mounting heights to ensure security from operation by nonqualified persons.

§§ 1910.309–1910.330 [Reserved]

SAFETY-RELATED WORK PRACTICES

§ 1910.331 Scope.

(a) *Covered work by both qualified and unqualified persons.* The provisions of §§1910.331 through 1910.335 cover electrical safety-related work practices for both qualified persons (those who have training in avoiding the electrical hazards of working on or near exposed energized parts) and unqualified persons (those with little or no such training) working on, near, or with the following installations:

- (1) *Premises wiring.* Installations of electric conductors and equipment within or on buildings or other structures, and on other premises such as yards, carnival, parking, and other lots, and industrial substations;
- (2) *Wiring for connection to supply.* Installations of conductors that connect to the supply of electricity; and
- (3) *Other wiring.* Installations of other outside conductors on the premises.
- (4) *Optical fiber cable.* Installations of optical fiber cable where such installations are made along with electric conductors.

NOTE: See §1910.399 for the definition of “qualified person.” See §1910.332 for training requirements that apply to qualified and unqualified persons.

(b) *Other covered work.* The provisions of §§1910.331 through 1910.335 also cover:

- (1) Work performed by unqualified persons on, near, or with the installations listed in paragraphs (c)(1) through (4) of this section; and
- (2) Work performed by qualified persons near the installations listed in paragraphs (c)(1) through (c)(4) of this section when that work is not on or directly associated with those installations.

(c) *Excluded work by qualified persons.* The provisions of §§1910.331 through 1910.335 do not apply to work performed by qualified persons on or directly associated with the following installations:

- (1) *Generation, transmission, and distribution installations.* Installations for the generation, control, transformation, transmission, and distribution of electric energy (including communication and metering) located in buildings used for such purposes or located outdoors.

NOTE 1 TO PARAGRAPH (c)(1): Work on or directly associated with installations of utilization equipment used for purposes other than generating, transmitting, or distributing electric energy (such as installations which are in office buildings, warehouses, garages, machine shops, or recreational buildings, or other utilization installations which are not an integral part of a generating installation, substation, or control center) is covered under paragraph (a)(1) of this section.

NOTE 2 TO PARAGRAPH (c)(1): For work on or directly associated with utilization installations, an employer who complies with the work practices of §1910.269 (electric power generation, transmission, and distribution) will be deemed to be in compliance with §§1910.333(c) and 1910.335. However, the requirements of §§1910.332, 1910.333(a), 1910.333(b), and 1910.334 apply to *all* work on or directly associated with utilization installations, regardless of whether the work is performed by qualified or unqualified persons.

NOTE 3 TO PARAGRAPH (c)(1): Work on or directly associated with generation, transmission, or distribution installations includes:

- (1) Work performed directly on such installations, such as repairing overhead or underground distribution lines or repairing a feed-