

WAC 296-24-95713 Special systems. (1) **Systems over 600 volts, nominal.** This subsection covers the general requirements for all circuits and equipment operated at over 600 volts.

(a) **Aboveground wiring methods.**

(i) You must install aboveground conductors in rigid metal conduit, in intermediate metal conduit, in electrical metallic tubing, in rigid nonmetallic conduit, in cable trays, as busways, as cablebus, in other identified raceways, or as open runs of metal-clad cable suitable for the use and purpose. In locations accessible to qualified persons only, open runs of Type MV cables, bare conductors, and bare busbars are also permitted. Busbars must be either copper or aluminum. Open runs of insulated wires and cables having a bare lead sheath or a braided outer covering must be supported in a manner designed to prevent physical damage to the braid or sheath.

(ii) You must enclose conductors emerging from the ground in approved raceways.

(b) **Braid-covered insulated conductors—Open installations.** The braid on open runs of braid-covered insulated conductors must be flame retardant or must have a flame-retardant saturant applied after installation. You must strip back this treated braid covering a safe distance at conductor terminals, according to the operating voltage.

(c) **Insulation shielding.**

(i) You must remove metallic and semiconductor insulation shielding components of shielded cables for a distance dependent on the circuit voltage and insulation. You must provide stress reduction means at all terminations of factory-applied shielding.

(ii) You must ground metallic shielding components such as tapes, wires, or braids, or combinations thereof, and their associated conducting and semiconducting components.

(d) **Moisture or mechanical protection for metal-sheathed cables.** Where cable conductors emerge from a metal sheath and where protection against moisture or physical damage is necessary, the insulation of the conductors must be protected by a cable sheath terminating device.

(e) **Interrupting and isolating devices.**

(i) Circuit breaker installations located indoors must consist of metal-enclosed units or fire-resistant cell-mounted units. In locations accessible only to qualified employees, open mounting of circuit breakers is permitted. You must provide a means of indicating the open and closed position of circuit breakers.

(ii) Where fuses are used to protect conductors and equipment, you must place a fuse in each ungrounded conductor. Two power fuses may be used in parallel to protect the same load, if both fuses have identical ratings, and if both fuses are installed in an identified common mounting with electrical connections that will divide the current equally. Power fuses of the vented type may not be used indoors, underground, or in metal enclosures unless identified for the use.

(iii) Fused cutouts installed in buildings or transformer vaults must be of a type identified for the purpose. Distribution cutouts may not be used indoors, underground, or in metal enclosures. They must be readily accessible for fuse replacement.

(iv) Where fused cutouts are not suitable to interrupt the circuit manually while carrying full load, you must install an approved means to interrupt the entire load. Unless the fused cutouts are interlocked with the switch to prevent opening of the cutouts under load, you must place a conspicuous sign at such cutouts reading: "WARNING—DO NOT OPERATE UNDER LOAD."

(v) You must provide suitable barriers or enclosures to prevent contact with nonshielded cables or energized parts of oil-filled cut-outs.

(vi) Load interrupter switches may be used only if suitable fuses or circuits are used in conjunction with these devices to interrupt fault currents.

(A) Where these devices are used in combination, you must coordinate them electrically so that they will safely withstand the effects of closing, carrying, or interrupting all possible currents up to the assigned maximum short-circuit rating.

(B) Where more than one switch is installed with interconnected load terminals to provide for alternate connection to different supply conductors, you must provide each switch with a conspicuous sign reading: "WARNING—SWITCH MAY BE ENERGIZED BY BACKFEED."

(vii) You must provide a means (for example, a fuseholder and fuse designed for the purpose) to completely isolate equipment for inspection and repairs. Isolating means that they are not designed to interrupt the load current of the circuit and must be either interlocked with an approved circuit interrupter or provided with a sign warning against opening them under load.

(f) **Mobile and portable equipment.**

(i) You must provide a metallic enclosure on the mobile machine for enclosing the terminals of the power cable. The enclosure must include provisions for a solid connection for the grounding terminal to effectively ground the machine frame. The method of cable termination used must prevent any strain or pull on the cable from stressing the electrical connections. The enclosure must have provision for locking so that only authorized qualified persons may open it and you must mark it with a sign warning of the presence of energized parts.

(ii) All energized switching and control parts must be enclosed in effectively grounded metal cabinets or enclosures. Circuit breakers and protective equipment must have the operating means projecting through the metal cabinet or enclosure so these units can be reset without locked doors being opened. You must lock enclosures and metal cabinets so that only authorized qualified persons have access and you must mark them with a sign warning of the presence of energized parts. You must guard collector ring assemblies on revolving-type machines (shovels, draglines, etc.).

(g) **Tunnel installations.** This subsection applies to installation and use of high-voltage power distribution and utilization equipment that is portable or mobile, such as substations, trailers, cars, mobile shovels, draglines, hoists, drills, dredges, compressors, pumps, conveyors, and underground excavators.

(i) You must install conductors in tunnels in one or more of the following:

(A) Metal conduit or other metal raceway;

(B) Type MC cable; or

(C) Other approved multiconductor cable.

(ii) Multiconductor portable cable may supply mobile equipment.

(iii) You must also locate or guard conductors and cables so as to protect them from physical damage. You must run an equipment grounding conductor with circuit conductors inside the metal raceway or inside the multiconductor cable jacket. The equipment grounding conductor may be insulated or bare.

(iv) Bare terminals of transformers, switches, motor controllers, and other equipment must be enclosed to prevent accidental contact with energized parts.

(v) Enclosures for use in tunnels must be drip-proof, weather-proof, or submersible as required by the environmental conditions.

(vi) Switch or contactor enclosures may not be used as junction boxes or raceways for conductors feeding through or tapping off to other switches, unless special designs are used to provide adequate space for this purpose.

(vii) You must install a disconnecting means that simultaneously opens all ungrounded conductors at each transformer or motor location.

(viii) You must effectively ground and bond all nonenergized metal parts of electric equipment and metal raceways and cable sheaths to all metal pipes and rails at the portal and at intervals not exceeding 1000 feet throughout the tunnel.

(2) **Emergency power systems.** This subsection applies to circuits, systems, and equipment intended to supply power for illumination and special loads in the event of failure of the normal supply.

(a) **Wiring methods.** You must keep emergency circuit wiring entirely independent of all other wiring and equipment and may not enter the same raceway, cable, box, or cabinet or other wiring except where common circuit elements suitable for the purpose are required, or for transferring power from the normal to the emergency source.

(b) **Emergency illumination.** Emergency illumination must include all required means of egress lighting, illuminated exit signs, and all other lights necessary to provide illumination. Where emergency lighting is necessary, you must arrange the system so that the failure of any individual lighting element, such as the burning out of a light bulb, cannot leave any space in total darkness.

(c) **Signs.**

(i) You must place a sign at the service entrance equipment indicating the type and location of on-site emergency power sources. However, a sign is not required for individual unit equipment.

(ii) Where the grounded circuit conductor connected to the emergency source is connected to a grounding electrode conductor at a location remote from the emergency source, there must be a sign at the grounding location that must identify all emergency and normal sources connected at that location.

(3) **Class 1, Class 2, and Class 3 remote control, signaling, and power-limited circuits.**

(a) **Classification.** Class 1, Class 2, and Class 3 remote control, signaling, or power-limited circuits are characterized by their usage and electrical power limitation that differentiates them from light and power circuits. These circuits are classified in accordance with their respective voltage and power limitations as summarized in (a) (i) through (iii) of this subsection.

(i) You must supply a Class 1 power-limited circuit from a source having a rated output of not more than 30 volts and 1000 volt-amperes.

(ii) A Class 1 remote control circuit or a Class 1 signaling circuit must have a voltage not exceeding 600 volts; however, the power output of the source need not be limited.

(iii) The power source for a Class 2 or Class 3 circuit must be listed equipment marked as a Class 2 or Class 3 power source, except as follows:

(A) Thermocouples do not require listing as a Class 2 power source; and

(B) A dry cell battery is considered an inherently limited Class 2 power source, provided the voltage is 30 volts or less and the capacity is less than or equal to that available from series-connected No. 6 carbon zinc cells.

(b) **Marking.** You must durably mark a Class 2 or Class 3 power supply unit where plainly visible to indicate the class of supply and its electrical rating.

(c) **Separation from conductors of other circuits.** Cables and conductors of Class 2 and Class 3 circuits may not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power, Class 1, nonpower-limited fire alarm circuits, and medium power network-powered broadband communications cables unless a barrier or other equivalent form of protection against contact is employed.

(4) **Fire alarm systems.**

(a) **Classifications.** You must classify fire alarm circuits either as nonpower limited or power limited.

(b) **Power sources.** The power sources for use with fire alarm circuits must be either power limited or nonpower limited as follows:

(i) The power source of nonpower-limited fire alarm (NPLFA) circuits must have an output voltage of not more than 600 volts, nominal; and

(ii) The power source for a power-limited fire alarm (PLFA) circuit must be listed equipment marked as a PLFA power source.

(c) **Separation from conductors of other circuits.**

(i) Nonpower-limited fire alarm circuits and Class 1 circuits may occupy the same enclosure, cable, or raceway provided all conductors are insulated for maximum voltage of any conductor within the enclosure, cable, or raceway. Power supply and fire alarm circuit conductors are permitted in the same enclosure, cable, or raceway only if connected to the same equipment.

(ii) Power-limited circuit cables and conductors may not be placed in any cable, cable tray, compartment, enclosure, outlet box, raceway, or similar fitting with conductors of electric light, power, Class 1, nonpower-limited fire alarm circuit conductors, or medium power network-powered broadband communications circuits.

(iii) You must separate power-limited fire alarm circuit conductors at least 2 inches 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 is employed.

(iv) Conductors of one or more Class 2 circuits are permitted within the same cable, enclosure, or raceway with conductors of power-limited fire alarm circuits provided that the insulation of Class 2 circuit conductors in the cable, enclosure, or raceway is at least that needed for the power-limited fire alarm circuits.

(d) **Identification.** You must identify fire alarm circuits at terminal and junction locations in a manner that will prevent unintentional interference with the signaling circuit during testing and servicing. You must durably mark power-limited fire alarm circuits as such where plainly visible at terminations.

(5) **Communications systems.** This subsection applies to central-station-connected and noncentral-station-connected telephone circuits, radio and television receiving and transmitting equipment, including community antenna television and radio distribution systems, telegraph, district messenger, and outside wiring for fire and burglar alarm, and similar central station systems. These installations need not comply with the provisions of WAC 296-24-95703 through 296-24-95713(4), except for WAC 296-24-95705 (3) (a) and 296-24-95711.

(a) **Protective devices.**

(i) You must provide a listed primary protector on each circuit run partly or entirely in aerial wire or aerial cable not confined within a block.

(ii) You must also provide a listed primary protector 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, you must protect each interbuilding circuit on premises by a listed primary protector at each end of the interbuilding circuit.

(b) Conductor location.

(i) You must keep lead-in or aerial-drop cables from a pole or other support, including the point of initial attachment to a building or structure, away from electric light, power, Class 1, or nonpower-limited fire alarm circuit conductors so as to avoid the possibility of accidental contact.

(ii) You must maintain a separation of at least 6 feet 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, you must meet the following conditions:

(A) Where practicable, you must locate communication wires and cables on poles 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) You must separate indoor communications wires and cables at least 2 inches 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, approved for the purpose, is employed.

(c) Equipment location. You must locate outdoor metal structures supporting antennas, as well as self-supporting antennas such as vertical rods or dipole structures, 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.

(d) Grounding.

(i) If exposed to contact with electric light and power conductors, you must ground the metal sheath of aerial cables entering buildings or you must interrupt them close to the entrance to the building by an insulating joint or equivalent device. Where protective devices are used, you must ground them in an approved manner.

(ii) You must permanently and effectively ground masts and metal structures supporting antennas without splice or connection in the grounding conductor.

(iii) Transmitters must 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. You must effectively ground all external metal handles and controls accessible to the operating personnel. Unpowered equipment and enclosures are considered to be grounded where connected to an attached coaxial cable with an effectively grounded metallic shield.

(6) Solar photovoltaic systems. This subsection covers solar photovoltaic systems that can be interactive with other electric power production sources or can stand alone with or without electrical ener-

gy storage such as batteries. These systems may have AC or DC output for utilization.

(a) **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.

(b) **Disconnecting means.** You must provide means 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.

(7) **Integrated electrical systems.**

(a) **Scope.** This subsection 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 must be a unitized segment of an industrial wiring system where all of the following conditions are met:

(i) The conditions of maintenance and supervision ensure that only qualified persons will service the system; and

(ii) Effective safeguards are established and maintained.

(b) **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 WAC 296-24-95705

(6)(a)(iv) if they are located with mounting heights to ensure security from operation by nonqualified persons.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. WSR 15-24-100, § 296-24-95713, filed 12/1/15, effective 1/5/16. Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060, and chapter 49.17 RCW. WSR 12-16-064, § 296-24-95713, filed 7/31/12, effective 9/1/12.]