

WAC 296-155-459 Special systems. (1) **Systems over 600 volts, nominal.** (a) through (d) of this subsection contain general requirements for all circuits and equipment operated at over 600 volts.

(a) **Wiring methods for fixed installations.**

(i) **Above ground.** You must install above-ground conductors in rigid metal conduit, in intermediate metal conduit, in cable trays, in cablebus, in other suitable raceways, or as open runs of metal-clad cable designed for the use and purpose. However, open runs of nonmetallic-sheathed cable or of bare conductors or busbars may be installed in locations which are accessible only to qualified persons. Metallic shielding components, such as tapes, wires, or braids for conductors, must be grounded. 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) **Installations emerging from the ground.** Conductors emerging from the ground must be enclosed in raceways. Raceways installed on poles must be of rigid metal conduit, intermediate metal conduit, PVC schedule 80 or equivalent extending from the ground line up to a point 8 feet (2.44 m) above finished grade. You must protect conductors entering a building by an enclosure from the ground line to the point of entrance. Metallic enclosures must be grounded.

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

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

(ii) **Fused cutouts.** Fused cutouts installed in buildings or transformer vaults must be of a type identified for the purpose. You must ensure that they are readily accessible for fuse replacement.

(iii) **Equipment isolating means.** You must provide a means to completely isolate equipment for inspection and repairs. Isolating means which are not designed to interrupt the load current of the circuit must be either interlocked with a circuit interrupter or provided with a sign warning against opening them under load.

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

(i) **Power cable connections to mobile machines.** 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 ground wire(s) terminal to ground effectively 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 only authorized qualified persons may open it and must be marked with a sign warning of the presence of energized parts.

(ii) **Guarding live parts.** 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 must be marked with a sign warning of the presence of energized parts. Collector ring assemblies on revolving-type machines (shovels, draglines, etc.) must be guarded.

(d) **Tunnel installations.**

(i) **Application.** The provisions of this item apply to installation and use of high-voltage power distribution and utilization equipment which is associated with tunnels and which is portable and/or mobile, such as substations, trailers, cars, mobile shovels, draglines, hoists, drills, dredges, compressors, pumps, conveyors, and underground excavators.

(ii) **Conductors.** 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 suitable multiconductor cable.

You must also locate or guard conductors so as to protect them from physical damage. Multiconductor portable cable may supply mobile equipment. An equipment grounding conductor must be run with circuit conductors inside the metal raceway or inside the multiconductor cable jacket. The equipment grounding conductor may be insulated or bare.

(iii) **Guarding live parts.** Bare terminals of transformers, switches, motor controllers, and other equipment must be enclosed to prevent accidental contact with energized parts. Enclosures for use in tunnels must be drip-proof, weatherproof, or submersible as required by the environmental conditions.

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

(v) **Grounding and bonding.** All nonenergized metal parts of electric equipment and metal raceways and cable sheaths must be grounded and bonded to all metal pipes and rails at the portal and at intervals not exceeding 1000 feet (305 m) throughout the tunnel.

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

(a) **Classification.** Class 1, Class 2, or Class 3 remote control, signaling, or power-limited circuits are characterized by their usage and electrical power limitation which 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) **Class 1 circuits.**

(A) A Class 1 power-limited circuit is supplied from a source having a rated output of not more than 30 volts and 1000 volt-amperes.

(B) A Class 1 remote control circuit or a Class 1 signaling circuit has a voltage which does not exceed 600 volts; however, the power output of the source need not be limited.

(ii) **Class 2 and Class 3 circuits.**

(A) Power for Class 2 and Class 3 circuits is limited either inherently (in which no overcurrent protection is required) or by a combination of a power source and overcurrent protection.

(B) The maximum circuit voltage is 150 volts AC or DC for a Class 2 inherently limited power source, and 100 volts AC or DC for a Class 3 inherently limited power source.

(C) The maximum circuit voltage is 30 volts AC and 60 volts DC for a Class 2 power source limited by overcurrent protection, and 150 volts AC or DC for a Class 3 power source limited by overcurrent protection.

(iii) **Application.** The maximum circuit voltages in (a)(i) and (ii) of this subsection apply to sinusoidal AC or continuous DC power sources, and where wet contact occurrence is not likely.

(b) **Marking.** You must not use a Class 2 or Class 3 power supply unit unless it is durably marked where plainly visible to indicate the class of supply and its electrical rating.

(3) **Communications systems.**

(a) **Scope.** These provisions for communication systems apply to such systems as central-station-connected and noncentral-station-connected telephone circuits, radio receiving and transmitting equipment, and outside wiring for fire and burglar alarm, and similar central station systems. These installations need not comply with the provisions of WAC 296-155-444 through 296-155-459(2), except WAC 296-155-447 (3)(a)(ii) and 296-155-456.

(b) **Protective devices.**

(i) **Circuits exposed to power conductors.** Communication circuits so located as to be exposed to accidental contact with light or power conductors operating at over 300 volts must have each circuit so exposed provided with an approved protector.

(ii) **Antenna lead-ins.** You must provide each conductor of a lead-in from an outdoor antenna with an antenna discharge unit or other means that will drain static charges from the antenna system.

(c) **Conductor location.**

(i) **Outside of buildings.**

(A) Receiving distribution lead-in or aerial-drop cables attached to buildings and lead-in conductors to radio transmitters must be so installed as to avoid the possibility of accidental contact with electric light or power conductors.

(B) The clearance between lead-in conductors and any lightning protection conductors must not be less than 6 feet (1.83 m).

(ii) **On poles.** Where practicable, you must locate communication conductors on poles below the light or power conductors. You must not attach communications conductors to a crossarm that carries light or power conductors.

(iii) **Inside of buildings.** You must locate indoor antennas, lead-ins, and other communication conductors attached as open conductors to the inside of buildings at least two inches (50.8 mm) from conductors of any light or power or Class 1 circuits unless a special and equally protective method of conductor separation is employed.

(d) **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 avoid the possibility of the antenna or structure falling into or making accidental contact with such circuits.

(e) **Grounding.**

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

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

(iii) **Equipment enclosures.** 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. All external metal handles and controls accessible to the operating personnel must be effectively grounded. Unpowered equipment and enclo-

tures must be considered grounded where connected to an attached coaxial cable with an effectively grounded metallic shield.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. WSR 16-09-085, § 296-155-459, filed 4/19/16, effective 5/20/16. Statutory Authority: Chapter 49.17 RCW. WSR 93-19-142 (Order 93-04), § 296-155-459, filed 9/22/93, effective 11/1/93; WSR 88-11-021 (Order 88-04), § 296-155-459, filed 5/11/88.]