

WAC 296-24-95703 General requirements. (1) **Approval.** The conductors and equipment required or permitted by this part is acceptable only if approved, as defined in WAC 296-24-990.

(2) **Examination, installation, and use of equipment.**

(a) **Examination.** Electric equipment must be free from recognized hazards that are likely to cause death or serious physical harm to employees. You must determine the safety of equipment using the following considerations:

(i) Suitability for installation and use in conformity with the provisions of this part;

Note: Suitability of equipment for an identified purpose may be evidenced by listing or labeling for that identified purpose.

(ii) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided;

(iii) Wire-bending and connection space;

(iv) Electrical insulation;

(v) Heating effects under all conditions of use;

(vi) Arcing effects;

(vii) Classification by type, size, voltage, current capacity, and specific use; and

(viii) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment.

(b) **Installation and use.** You must install and use listed or labeled equipment in accordance with any instructions included in the listing or labeling.

(c) **Insulation integrity.** Completed wiring installations must be free from short circuits and from grounds other than those required or permitted by this part.

(d) **Interrupting rating.** Equipment intended to interrupt current at fault levels must have an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals of the equipment. Equipment intended to interrupt current at other than fault levels must have an interrupting rating at nominal circuit voltage sufficient for the current that must be interrupted.

(e) **Circuit impedance and other characteristics.** You must select and coordinate the overcurrent protective devices, the total impedance, the component short-circuit current ratings, and other characteristics of the circuit to be protected to permit the circuit protective devices used to clear a fault to do so without the occurrence of extensive damage to the electrical components of the circuit. You must assume this fault to be either between two or more of the circuit conductors, or between any circuit conductor and the grounding conductor or enclosing metal raceway.

(f) **Deteriorating agents.** Unless identified for use in the operating environment, you must not locate any conductors or equipment in damp or wet locations; where exposed to gases, fumes, vapors, liquids, or other agents that have a deteriorating effect on the conductors or equipment; or where exposed to excessive temperatures.

(g) **Mechanical execution of work.** You must install electric equipment in a neat and workmanlike manner.

(i) You must effectively close unused openings in boxes, raceways, auxiliary gutters, cabinets, equipment cases, or housings to afford protection substantially equivalent to the wall of the equipment.

(ii) You must rack conductors to provide ready and safe access in underground and subsurface enclosures that persons enter for installation and maintenance.

(iii) Internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, may not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues.

(iv) There must be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment, such as parts that are broken, bent, cut, or deteriorated by corrosion, chemical action, or overheating.

(h) **Mounting and cooling of equipment.**

(i) You must firmly secure electric equipment to the surface on which it is mounted.

Note: Wooden plugs driven into holes in masonry, concrete, plaster, or similar materials are not considered secure means of fastening electric equipment.

(ii) You must install electric equipment that depends on the natural circulation of air and convection principles for cooling of exposed surfaces so that room airflow over such surfaces is not prevented by walls or by adjacent installed equipment. For equipment designed for floor mounting, you must provide clearance between top surfaces and adjacent surfaces to dissipate rising warm air.

(iii) You must install electric equipment provided with ventilating openings so that walls or other obstructions do not prevent the free circulation of air through the equipment.

(3) **Electrical connections.**

(a) **General.** Because of different characteristics of dissimilar metals:

(i) You must identify devices such as pressure terminal or pressure splicing connectors and soldering lugs for the material of the conductor and you must properly install and use them;

(ii) Conductors of dissimilar metals may not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors (such as copper and aluminum, copper and copper-clad aluminum, or aluminum and copper-clad aluminum) unless the device is identified for the purpose and conditions of use; and

(iii) Materials such as solder, fluxes, inhibitors, and compounds, where employed, must be suitable for the use and must be of a type that will not adversely affect the conductors, installation, or equipment.

(b) **Terminals.**

(i) Connection of conductors to terminal parts must ensure a good connection without damaging the conductors and must be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. However, No. 10 or smaller conductors may be connected by means of wire binding screws or studs and nuts having upturned lugs or equivalent.

(ii) You must identify terminals for more than one conductor and terminals used to connect aluminum as such.

(c) **Splices.**

(i) You must splice or join conductors with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. You must first splice or join soldered splices to be mechanically and electrically secure without solder and then soldered. You must cover all splices and joints and the free ends of conductors with an insulation equivalent to that of the conductors or with an insulating device identified for the purpose.

(ii) You must list wire connectors or splicing means installed on conductors for direct burial for such use.

(4) **Arcing parts.** You must enclose or separate and isolate parts of electric equipment that in ordinary operation produce arcs, sparks, flames, or molten metal from all combustible material.

(5) **Marking.**

(a) **Identification of manufacturer and ratings.** Electric equipment may not be used unless the following markings have been placed on the equipment:

(i) The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product may be identified; and

(ii) Other markings giving voltage, current, wattage, or other ratings as necessary.

(b) **Durability.** The marking must be of sufficient durability to withstand the environment involved.

(6) **Disconnecting means and circuits.**

(a) **Motors and appliances.** You must legibly mark each disconnecting means required by this part for motors and appliances to indicate its purpose, unless located and arranged so the purpose is evident.

(b) **Services, feeders, and branch circuits.** You must legibly mark each service, feeder, and branch circuit, at its disconnecting means or overcurrent device, to indicate its purpose, unless located and arranged so the purpose is evident.

(c) **Durability of markings.** The markings required by this section must be of sufficient durability to withstand the environment involved.

(d) **Capable of accepting a lock.** Disconnecting means required by this part must be capable of being locked in the open position.

(e) **Marking for series combination ratings.**

(i) Where circuit breakers or fuses are applied in compliance with the series combination ratings marked on the equipment by the manufacturer, you must legibly mark the equipment enclosures in the field to indicate that the equipment has been applied with a series combination rating.

(ii) The marking required by (e)(i) of this subsection must be readily visible and must state "Caution—Series Combination System Rated Amperes. Identified Replacement Component Required."

(7) **600 Volts, nominal, or less.** This subsection applies to electric equipment operating at 600 volts, nominal, or less to ground.

(a) **Space about electric equipment.** You must provide and maintain sufficient access and working space about all electric equipment to permit ready and safe operation and maintenance of such equipment.

(i) Working space for equipment likely to require examination, adjustment, servicing, or maintenance while energized must comply with the following dimensions, except as required or permitted elsewhere in this part:

(A) The depth of the working space in the direction of access to live parts may not be less than indicated in Table S-1. You must measure distances from the live parts if they are exposed or from the enclosure front or opening if they are enclosed;

(B) The width of working space in front of the electric equipment must be the width of the equipment or 30 inches, whichever is greater. In all cases, the working space must permit at least a 90-degree opening of equipment doors or hinged panels; and

(ii) Working space required by this standard may not be used for storage. When normally enclosed live parts are exposed for inspection

or servicing, you must suitably guard the working space, if in a passageway or general open space.

(iii) You must provide at least one entrance of sufficient area to give access to the working space about electric equipment.

(iv) For equipment rated 1200 amperes or more and over 6 feet wide, containing overcurrent devices, switching devices, or control devices, there must be one entrance not less than 24 inches wide and 6 feet 6 inches high at each end of the working space, except that:

(A) Where the location permits a continuous and unobstructed way of exit travel, one means of exit is permitted; or

(B) Where the working space required by (a)(i) of this subsection is doubled, only one entrance to the working space is required; however, the entrance must be located so that the edge of the entrance nearest the equipment is the minimum clear distance given in Table S-1 away from such equipment.

(v) You must provide illumination for all working spaces about service equipment, switchboards, panelboards, and motor control centers installed indoors. Additional lighting fixtures are not required where the working space is illuminated by an adjacent light source. In electric equipment rooms, the illumination may not be controlled by automatic means only.

(vi) The minimum headroom of working spaces about service equipment, switchboards, panelboards, or motor control centers must be as follows:

(A) For installations built before August 13, 2007, 6 feet 3 inches; and

(B) For installations built on or after August 13, 2007, 6 feet 6 inches, except that where the electrical equipment exceeds 6 feet 6 inches in height, the minimum headroom may not be less than the height of the equipment.

Table S-1—Minimum Depth of Clear Working Space at Electric Equipment, 600 V or Less

Nominal voltage to ground	Minimum clear distance for condition ^{2,3}		
	Condition A	Condition B	Condition C
	ft	ft	ft
0 - 150	13.0	13.0	3.0
151 - 600	13.01	3.5	4.0

Notes to Table S-1:

¹ Minimum clear distances may be 2 feet 6 inches for installations built before April 16, 1981.

² Conditions A, B, and C are as follows:

Condition A—Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by suitable wood or other insulating material. Insulated wire or insulated busbars operating at not over 300 volts are not considered live parts.

Condition B—Exposed live parts on one side and grounded parts on the other side.

Condition C—Exposed live parts on both sides of the work space (not guarded as provided in Condition A) with the operator between.

³ Working space is not required in back of assemblies such as dead-front switchboards or motor control centers where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on deenergized parts on the back of enclosed equipment, you must provide a minimum working space of 30 inches horizontally.

(vii) Switchboards, panelboards, and distribution boards installed for the control of light and power circuits, and motor control centers must be located in dedicated spaces and protected from damage.

(A) For indoor installation, the dedicated space must comply with the following:

(I) The space equal to the width and depth of the equipment and extending from the floor to a height of 6 feet above the equipment or to the structural ceiling, whichever is lower, must be dedicated to the electrical installation. Unless isolated from equipment by height or physical enclosures or covers that will afford adequate mechanical protection from vehicular traffic or accidental contact by unauthorized personnel or that complies with (a)(vii)(A)(II) of this subsection, piping, ducts, or equipment foreign to the electrical installation may not be located in this area;

(II) You must keep the space equal to the width and depth of the equipment clear of foreign systems unless protection is provided to avoid damage from condensation, leaks, or breaks in such foreign systems. This area must extend from the top of the electric equipment to the structural ceiling;

(III) Sprinkler protection is permitted for the dedicated space where the piping complies with this section; and

(IV) Control equipment that by its very nature or because of other requirements in this part must be adjacent to or within sight of its operating machinery is permitted in the dedicated space.

Note: A dropped, suspended, or similar ceiling that does not add strength to the building structure is not considered a structural ceiling.

(B) Outdoor electric equipment must be installed in suitable enclosures and must be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. No architectural appurtenance or other equipment may be located in the working space required by (a)(i) of this subsection.

(b) Guarding of live parts.

(i) Except as elsewhere required or permitted by this standard, you must guard live parts of electric equipment operating at 50 volts or more against accidental contact by use of approved cabinets or other forms of approved enclosures or by any of the following means:

(A) By location in a room, vault, or similar enclosure that is accessible only to qualified persons;

(B) By suitable permanent, substantial partitions or screens so arranged so that only qualified persons will have access to the space within reach of the live parts. Any openings in such partitions or screens must be so sized and located that persons are not likely to come into accidental contact with the live parts or to bring conducting objects into contact with them;

(C) By placement on a suitable balcony, gallery, or platform so elevated and otherwise located as to prevent access by unqualified persons; or

(D) By elevation of 8 feet or more above the floor or other working surface.

(ii) In locations where electric equipment would be exposed to physical damage, you must arrange enclosures or guards and ensure that they are of such strength so as to prevent such damage.

(iii) You must mark entrances to rooms and other guarded locations containing exposed live parts with conspicuous warning signs forbidding unqualified persons to enter.

(8) Over 600 volts, nominal.

(a) **General.** Conductors and equipment used on circuits exceeding 600 volts, nominal, must comply with all applicable provisions of subsections (1) through (7) of this section and with the following provisions, which supplement or modify the preceding requirements. However, (b) through (d) of this subsection do not apply to the equipment on the supply side of the service point.

(b) **Enclosure for electrical installations.**

(i) Electrical installations in a vault, room, or closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by lock and key or other approved means, are considered to be accessible to qualified persons only. The type of enclosure used in a given case must be designed and constructed according to the hazards associated with the installation.

(ii) For installations other than equipment described in (b)(v) of this subsection, you must use a wall, screen, or fence to enclose an outdoor electrical installation to deter access by persons who are not qualified. A wall, screen, or fence less than 8 feet in height is not considered to prevent access unless it has other features that provide a degree of isolation equivalent to an 8 foot fence.

(iii) The following requirements apply to indoor installations that are accessible to other than qualified persons:

(A) You must make the installations with metal-enclosed equipment or you must enclose them in a vault or in an area to which access is controlled by a lock;

(B) You must mark metal-enclosed switchgear, unit substations, transformers, pull boxes, connection boxes, and other similar associated equipment with appropriate caution signs; and

(C) Openings in ventilated dry-type transformers and similar openings in other equipment must be designed so that foreign objects inserted through these openings will be deflected from energized parts.

(iv) Outdoor electrical installations having exposed live parts must be accessible to qualified persons only.

(v) The following requirements apply to outdoor enclosed equipment accessible to unqualified employees:

(A) Ventilating or similar openings in equipment must be so designed that foreign objects inserted through these openings will be deflected from energized parts;

(B) Where exposed to physical damage from vehicular traffic, you must provide suitable guards;

(C) Nonmetallic or metal-enclosed equipment located outdoors and accessible to the general public must be designed so that exposed nuts or bolts cannot be readily removed, permitting access to live parts;

(D) Where nonmetallic or metal-enclosed equipment is accessible to the general public and the bottom of the enclosure is less than 8 feet above the floor or grade level, you must keep the enclosure door or hinged cover locked; and

(E) Except for underground box covers that weigh over 100 pounds, you must lock, bolt, or screw on doors and covers of enclosures used solely as pull boxes, splice boxes, or junction boxes.

(c) **Work space about equipment.** You must provide and maintain sufficient space about electric equipment to permit ready and safe operation and maintenance of such equipment. Where energized parts are exposed, the minimum clear work space may not be less than 6 feet 6 inches high (measured vertically from the floor or platform) or less than 3 feet wide (measured parallel to the equipment). The depth must be as required in (e)(i) of this subsection. In all cases, the work

space must be adequate to permit at least a 90-degree opening of doors or hinged panels.

(d) **Entrance and access to work space.**

(i) You must provide at least one entrance not less than 24 inches wide and 6 feet 6 inches high to give access to the working space about electric equipment.

(A) On switchboard and control panels exceeding 6 feet in width, there must be one entrance at each end of such boards unless the location of the switchboards and control panels permits a continuous and unobstructed way of exit travel, or unless the work space required in (e)(i) of this subsection is doubled.

(B) Where one entrance to the working space is permitted under the conditions described in (d)(i)(A) of this subsection, you must locate the entrance so that the edge of the entrance nearest the switchboards and control panels is at least the minimum clear distance given in Table S-2 away from such equipment.

(C) Where bare energized parts at any voltage or insulated energized parts above 600 volts, nominal, to ground are located adjacent to such entrance, you must suitably guard them.

(ii) You must provide permanent ladders or stairways to give safe access to the working space around electric equipment installed on platforms, balconies, mezzanine floors, or in attic or roof rooms or spaces.

(e) **Working space and guarding.**

(i) Except as elsewhere required or permitted in this part, the minimum clear working space in the direction of access to live parts of electric equipment may not be less than specified in Table S-2. You must measure distances from the live parts, if they are exposed, or from the enclosure front or opening, if they are enclosed.

(ii) If switches, cutouts, or other equipment operating at 600 volts, nominal, or less, are installed in a room or enclosure where there are exposed live parts or exposed wiring operating at over 600 volts, nominal, you must effectively separate the high-voltage equipment from the space occupied by the low-voltage equipment by a suitable partition, fence, or screen. However, switches or other equipment operating at 600 volts, nominal, or less, and serving only equipment within the high-voltage vault, room, or enclosure may be installed in the high-voltage enclosure, room, or vault if accessible to qualified persons only.

(iii) The following requirements apply to the entrances to all buildings, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 600 volts, nominal:

(A) You must keep the entrances locked unless they are under the observation of a qualified person at all times; and

(B) You must provide permanent and conspicuous warning signs, reading substantially as follows: "DANGER—HIGH VOLTAGE—KEEP OUT."

(iv) You must provide illumination for all working spaces about electric equipment.

(A) You must arrange the lighting outlets so that persons changing lamps or making repairs on the lighting system will not be endangered by live parts or other equipment.

(B) You must locate the points of control so that persons are prevented from contacting any live part or moving part of the equipment while turning on the lights.

(v) You must maintain unguarded live parts above working space at elevations not less than specified in Table S-3.

(vi) Pipes or ducts that are foreign to the electrical installation and that require periodic maintenance or whose malfunction would endanger the operation of the electrical system may not be located in the vicinity of service equipment, metal-enclosed power switchgear, or industrial control assemblies. You must provide protection where necessary to avoid damage from condensation leaks and breaks in such foreign systems.

Note: Piping and other facilities are not considered foreign if provided for fire protection of the electrical installation.

Table S-2—Minimum Depth of Clear Working Space at Electric Equipment, Over 600 V

Nominal voltage to ground	Minimum clear distance for condition ^{2, 3}		
	Condition A	Condition B	Condition C
	ft	ft	ft
601-2500 V	3.0	4.0	5.0
2501-9000 V	4.0	5.0	6.0
9001 V-25 kV	5.0	6.0	9.0
Over 25-75 kV ¹	6.0	8.0	10.0
Above 75 kV ¹	8.0	10.0	12.0

Notes to Table S-2:

- ¹ Minimum depth of clear working space in front of electric equipment with a nominal voltage to ground above 25,000 volts may be the same as that for 25,000 volts under Conditions A, B, and C for installations built before April 16, 1981.
- ² Conditions A, B, and C are as follows:
 Condition A—Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by suitable wood or other insulating material. Insulated wire or insulated busbars operating at not over 300 volts are not considered live parts.
 Condition B—Exposed live parts on one side and grounded parts on the other side. Concrete, brick, and tile walls are considered as grounded surfaces.
 Condition C—Exposed live parts on both sides of the work space (not guarded as provided in Condition A) with the operator between.
- ³ Working space is not required in back of equipment such as dead-front switchboards or control assemblies that has no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on deenergized parts on the back of enclosed equipment, you must provide a minimum working space of 30 inches horizontally.

Table S-3—Elevation of Unguarded Live Parts Above Working Space

Nominal voltage between phases	Elevation
	ft
601-7500 V	9.0
7501 V-35 kV	9.0
Over 35 kV	9.0 + 0.37 in/kV over 35 kV

¹ The minimum elevation may be 8 feet 6 inches for installations built before August 13, 2007. The minimum elevation may be 8 feet for installations built before April 16, 1981, if the nominal voltage between phases is in the range of 601-6600 volts.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. WSR 15-24-100, § 296-24-95703, 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, § 296-24-95703, filed 7/31/12, effective 9/1/12.]