

WAC 296-155-444 General requirements. (1) **Approval.** All electrical conductors and equipment must be approved.

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

(a) **Examination.** You must ensure that electrical equipment is free from recognized hazards that are likely to cause death or serious physical harm to employees. You must determine safety of equipment on the basis of the following considerations:

(i) Suitability for installation and use in conformity with the provisions of this part. Suitability of equipment for an identified purpose may be evidenced by listing, labeling, or certification 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) Electrical insulation.

(iv) Heating effects under conditions of use.

(v) Arcing effects.

(vi) Classification by type, size, voltage, current capacity, specific use.

(vii) Other factors which contribute to the practical safeguarding of employees using or likely to come in contact with the equipment.

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

(3) **Interrupting rating.** Equipment intended to break current must have an interrupting rating at system voltage sufficient for the current that must be interrupted.

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

(a) **Mounting.** You must firmly secure electric equipment to the surface on which it is mounted. You must not use wooden plugs driven into holes in masonry, concrete, plaster, or similar materials.

(b) **Cooling.** You must install electrical equipment which depends upon the natural circulation of air and convection principles for cooling of exposed surfaces so that room air flow 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. You must install electrical equipment provided with ventilating openings so that walls or other obstructions do not prevent the free circulation of air through the equipment.

(5) **Splices.** You must splice or join conductors with splicing devices designed for the use or by brazing, welding, or soldering with a fusible metal or alloy. You must first splice or join soldered splices so as to be mechanically and electrically secure without solder and then soldered. All splices and joints and the free ends of conductors must be covered with an insulation equivalent to that of the conductors or with an insulating device designed for the purpose.

(6) **Arcing parts.** Parts of electric equipment which in ordinary operation produce arcs, sparks, flames, or molten metal must be enclosed or separated and isolated from all combustible material.

(7) **Marking.** You must not use electrical equipment unless the manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product may be identified is placed on the equipment and unless other markings are provided giving voltage, current, wattage, or other ratings as necessary. The marking

must be of sufficient durability to withstand the environment involved.

(8) **Identification of disconnecting means and circuits.** 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. 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. These markings must be of sufficient durability to withstand the environment involved.

(9) **Construction site.** You must take precautions to make any necessary open wiring inaccessible to unauthorized personnel.

(10) **600 volts, nominal, or less.** This subsection applies to equipment operating at 600 volts, nominal, or less.

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

(i) **Working clearances.** Except as required or permitted elsewhere in this part, the dimension of the working space in the direction of access to live parts operating at 600 volts or less and likely to require examination, adjustment, servicing, or maintenance while alive must not be less than indicated in Table I-1. In addition to the dimensions shown in Table I-1, workspace must not be less than 30 inches (762 mm) wide in front of the electric equipment. You must measure distances from the live parts if they are exposed, or from the enclosure front or opening if the live parts are enclosed. Walls constructed of concrete, brick, or tile are considered to be grounded. 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.

Table I-1
Working Clearances

Nominal Voltage to Ground	Minimum Clear Distance for Conditions ¹		
	(a)	(b)	(c)
	Feet ²	Feet ²	Feet ²
0-150	3	3	3
151-600	3	3 1/2	4

¹ Conditions (a), (b), and (c) are as follows: (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 insulating material. Insulated wire or insulated busbars operating at not over 300 volts are not considered live parts. (b) Exposed live parts on one side and grounded parts on the other side. (c) Exposed live parts on both sides of the workspace not guarded provided in condition (a) with the operator between.

² Note: For International System of Units (SI): One foot = 0.3048m.

(ii) **Clear spaces.** You must not use working space required by this part used for storage. When normally enclosed live parts are exposed for inspection or servicing, you must guard the working space, if in a passageway or general open space.

(iii) **Access and entrance to working space.** You must provide at least one entrance to give access to the working space about electric equipment.

(iv) **Front working space.** Where there are live parts normally exposed on the front of switchboards or motor control centers, the working space in front of such equipment must not be less than 3 feet (914 mm).

(v) **Headroom.** The minimum headroom of working spaces about service equipment, switchboards, panelboards, or motor control centers must be 6 feet 3 inches (1.91 m).

(b) **Guarding of live parts.**

(i) Except as required or permitted elsewhere in this part, you must guard live parts of electric equipment operating at 50 volts or more against accidental contact by cabinets or other forms of 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 partitions or screens so arranged 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 location on a balcony, gallery, or platform so elevated and arranged as to exclude unqualified persons.

(D) By elevation of 8 feet (2.44 m) or more above the floor or other working surface and so installed as to exclude unqualified persons.

(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.

(11) **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 those requirements. The provisions of (b), (c), and (d) of this subsection do not apply to equipment on the supply side of the service conductors.

(b) **Enclosure for electrical installations.** Electrical installations in a vault, room, closet or in an area surrounded by a wall, screen, or fence, access to which is controlled by lock and key or other equivalent means, are considered to be accessible to qualified persons only. A wall, screen, or fence less than 8 feet (2.44 m) in height is not considered adequate to prevent access unless it has other features that provide a degree of isolation equivalent to an 8-foot (2.44 m) fence. You must keep the entrances to all buildings, rooms or enclosures containing exposed live parts or exposed conductors operating at over 600 volts, nominal, locked or they must be under the observation of a qualified person at all times.

(i) **Installations accessible to qualified persons only.** Electrical installations having exposed live parts must be accessible to qualified persons only and must comply with the applicable provisions of (c) of this subsection.

(ii) **Installations accessible to unqualified persons.** Electrical installations that are open to unqualified persons must be made with

metal-enclosed equipment or must be enclosed in a vault or in an area, access to which is controlled by a lock. Metal-enclosed switchgear, unit substations, transformers, pull boxes, connection boxes, and other similar associated equipment must be marked with appropriate caution signs. If equipment is exposed to physical damage from vehicular traffic, you must provide guards to prevent such damage. Ventilating or similar openings in metal-enclosed equipment must be designed so that foreign objects inserted through these openings will be deflected from energized parts.

(c) **Workspace 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 workspace must not be less than 6 feet 6 inches (1.98 m) high (measured vertically from the floor or platform,) or less than 3 feet (914 mm) wide (measured parallel to the equipment.) The depth must be as required in Table I-2. The workspace must be adequate to permit at least a 90 degree opening of doors or hinged panels.

(i) **Working space.** The minimum clear working space in front of electric equipment such as switchboards, control panels, switches, circuit breakers, motor controllers, relays, and similar equipment must not be less than specified in Table I-2 unless otherwise specified in this part. You must measure distances from the live parts if they are exposed, or from the enclosure front or opening if the live parts are enclosed. However, working space is not required in back of equipment such as deadfront switchboards or control assemblies 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 (762 mm) horizontally.

Table I-2
Minimum Depth of Clear Working
Space in Front of Electric Equipment

Nominal Voltage to Ground	Minimum Clear Distance for Conditions ¹		
	(a)	(b)	(c)
	Feet ²	Feet ²	Feet ²
601 to 2,500	3	4	5
2,501 to 9,000	4	5	6
9,001 to 25,000	5	6	9
25,001 to 75kV	6	8	10
Above 75kV	8	10	12

¹ Conditions (a), (b), and (c) are as follows: (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 insulating materials. Insulated wire or insulated busbars operating at not over 300 volts are not considered live parts. (b) Exposed live parts on one side and grounded parts on the other side. Walls constructed of concrete, brick, or the tile are considered to be grounded surfaces. (c) Exposed live parts on both sides of the workspace (not guarded as provided in Condition (a)) with the operator between.

² Note: For SI units: One foot = 0.3048m.

(ii) **Lighting outlets and points of control.** 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. You must locate the points of control so that persons are not likely to come in contact with any live part or moving part of the equipment while turning on the lights.

(iii) **Elevation of unguarded live parts.** You must maintain live parts above working space at elevations not less than specified in Table I-3.

Table I-3
Elevation of Unguarded
Energized Parts Above Working Space

Nominal Voltage to Between Phases	Minimum Elevation
601 to 7,500	8 feet 6 inches ¹
7,501 to 35,000	9 feet
Over 35kV	9 feet + 0.37 inches per kV above 35kV

¹ Note: For SI units: One inch = 25.4mm, one foot = 0.3048m.

(d) **Entrance and access to workspace.** You must provide at least one entrance not less than 24 inches (610 mm) wide and 6 feet 6 inches (1.98 m) high to give access to the working space about electric equipment. On switchboard and control panels exceeding 48 inches (1.22 m) in width, there must be one entrance at each end of such board where practicable. Where bare energized parts at any voltage or insulated energized parts above 600 volts are located adjacent to such entrance, you must guard them.

(12) **Welding and cutting equipment.** Welding and cutting equipment must meet the requirements specified in Parts D and H of this chapter.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. WSR 16-09-085, § 296-155-444, filed 4/19/16, effective 5/20/16. Statutory Authority: Chapter 49.17 RCW. WSR 93-19-142 (Order 93-04), § 296-155-444, filed 9/22/93, effective 11/1/93; WSR 92-23-017 (Order 92-13), § 296-155-444, filed 11/10/92, effective 12/18/92; WSR 88-11-021 (Order 88-04), § 296-155-444, filed 5/11/88.]