

Electric Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for Alternating-Current Systems

Nominal System Voltage Range, Phase to Phase – **Less than 50V**

- Limited Approach Boundary - Exposed Movable Conductor^c – **Not Specified**
- Limited Approach Boundary - Exposed Fixed Circuit Part – **Not Specified**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder – **Not Specified**

Nominal System Voltage Range, Phase to Phase – **50V-150V^e**

- Limited Approach Boundary - Exposed Movable Conductor^c – **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part – **1.0 m (3 ft 6 in)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder – **Avoid Contact**

Nominal System Voltage Range, Phase to Phase – **151 V–750 V**

- Limited Approach Boundary - Exposed Movable Conductor^c - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **1.0 m (3 ft 6 in)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **0.31 m (1 ft 0 in.)**

Nominal System Voltage Range, Phase to Phase – **751 V–5 kV**

- Limited Approach Boundary - Exposed Movable Conductor^c - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **1.0 m (3 ft 6 in)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **0.63 m (2 ft 1 in.)**

Nominal System Voltage Range, Phase to Phase – **5.1 kV–15 kV**

- Limited Approach Boundary - Exposed Movable Conductor^c - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **1.5 m (5 ft 0 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **0.65 m (2 ft 2 in.)**

Nominal System Voltage Range, Phase to Phase – **15.1 kV–36 kV**

- Limited Approach Boundary - Exposed Movable Conductor^c - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **1.8 m (6 ft 0 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **0.77 m (2 ft 7 in.)**

Nominal System Voltage Range, Phase to Phase – **36.1 kV–46 kV**

- Limited Approach Boundary - Exposed Movable Conductor^c - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **2.5 m (8 ft 0 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **0.84 m (2 ft 10 in.)**

Nominal System Voltage Range, Phase to Phase – 46.1 kV–72.5 kV

- Limited Approach Boundary - Exposed Movable Conductor^c - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **2.5 m (8 ft 0 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **1.0 m (3 ft 4 in.)**

Nominal System Voltage Range, Phase to Phase – 72.6 kV–121 kV

- Limited Approach Boundary - Exposed Movable Conductor^c - **3.3 m (10 ft 8 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **2.5 m (8 ft 0 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **1.2 m (3 ft 9 in.)**

Nominal System Voltage Range, Phase to Phase – 121.1 kV–145 kV

- Limited Approach Boundary - Exposed Movable Conductor^c - **3.4 m (11 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **3.1 m (10 ft 0 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **1.3 m (4 ft 4 in.)**

Nominal System Voltage Range, Phase to Phase – 145.1 kV–169 kV

- Limited Approach Boundary - Exposed Movable Conductor^c - **3.6 m (11 ft 8 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **3.6 m (11 ft 8 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **1.5 m (4 ft 10 in.)**

Nominal System Voltage Range, Phase to Phase – 169.1 kV–242 kV

- Limited Approach Boundary - Exposed Movable Conductor^c - **4.0 m (13 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **4.0 m (13 ft 0 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **2.1 m (6 ft 8 in.)**

Nominal System Voltage Range, Phase to Phase – 242.1 kV–362 kV

- Limited Approach Boundary - Exposed Movable Conductor^c - **4.7 m (15 ft 4 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **4.7 m (15 ft 4 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **3.5 m (11 ft 2 in.)**

Nominal System Voltage Range, Phase to Phase – 362.1 kV–420 kV

- Limited Approach Boundary - Exposed Movable Conductor^c - **5.8 m (19 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **5.8 m (19 ft 0 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **4.3 m (14 ft 0 in.)**

Nominal System Voltage Range, Phase to Phase – 420.1 kV–550 kV

- Limited Approach Boundary - Exposed Movable Conductor^c - **5.8 m (19 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **5.8 m (19 ft 0 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **5.1 m (16 ft 8 in.)**

Nominal System Voltage Range, Phase to Phase – 550.1 kV–800 kV

- Limited Approach Boundary - Exposed Movable Conductor^c - **7.2 m (23 ft 9 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **7.2 m (23 ft 9 in.)**
- Restricted Approach Boundary^{b,d}; Includes Inadvertent Movement Adder - **6.9 m (22 ft 7 in.)**

Notes:

(1) For arc flash boundary, see 130.5(E).

(2) All dimensions are distance from exposed energized electrical conductors or circuit part to employee.

^aFor single-phase systems above 250 volts, select the range that is equal to the system's maximum phase-to-ground voltage multiplied by 1.732.

^bSee definition in Article 100 and text in 130.4(F)(3) and Informative Annex C for elaboration.

^cExposed movable conductors describes a condition in which the distance between the conductor and a person is not under the control of the person. The term is normally applied to overhead line conductors supported by poles.

^dThe restricted approach boundary in Column 4 is based on an elevation not exceeding 900 m (3000 ft). For higher elevations, adjustment of the restricted approach boundary shall be considered.

^eThis includes circuits where the exposure does not exceed 120 volts nominal.

Electric Shock Protection Approach Boundaries to Exposed Energized Electrical Conductors or Circuit Parts for Direct-Current Systems

Nominal Potential Difference - **Less than 50 V**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **Not specified**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **Not specified**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **Not specified**

Nominal Potential Difference - **50 V–300 V**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **1.0 m (3 ft 6 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **Avoid contact**

Nominal Potential Difference - **301 V–1 kV**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **1.0 m (3 ft 6 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **0.3 m (1 ft 0 in.)**

Nominal Potential Difference - **1.1 kV–5 kV**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **1.5 m (5 ft 0 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **0.5 m (1 ft 5 in.)**

Nominal Potential Difference - **5.1 kV–15 kV**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **1.5 m (5 ft 0 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **0.7 m (2 ft 2 in.)**

Nominal Potential Difference - **15.1 kV–45 kV**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **2.5 m (8 ft 0 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **0.8 m (2 ft 9 in.)**

Nominal Potential Difference - **45.1 kV– 75 kV**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **3.1 m (10 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **2.5 m (8 ft 0 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **1.0 m (3 ft 6 in.)**

Nominal Potential Difference - **75.1 kV–150 kV**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **3.3 m (10 ft 8 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **3.1 m (10 ft 0 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **1.2 m (3 ft 10 in.)**

Nominal Potential Difference - **150.1 kV–250 kV**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **3.6 m (11 ft 8 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **3.6 m (11 ft 8 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **1.6 m (5 ft 3 in.)**

Nominal Potential Difference - **250.1 kV–500 kV**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **6.0 m (20 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **6.0 m (20 ft 0 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **3.5 m (11 ft 6 in.)**

Nominal Potential Difference - **500.1 kV–800 kV**

- Limited Approach Boundary - Exposed Movable Conductor^{*a} - **8.0 m (26 ft 0 in.)**
- Limited Approach Boundary - Exposed Fixed Circuit Part - **8.0 m (26 ft 0 in.)**
- Restricted Approach Boundary^b; Includes Inadvertent Movement Adder – **5.0 m (16 ft 5 in.)**

Note: All dimensions are distance from exposed energized electrical conductors or circuit parts to worker.

^{*a} Exposed movable conductor describes a condition in which the distance between the conductor and a person is not under the control of the person. The term is normally applied to overhead line conductors supported by poles.

^b The restricted approach boundary in Column 4 is based on an elevation not exceeding 900 m (3000 ft). For higher elevations, adjustment of the restricted approach boundary shall be considered.