Plugs and receptacles must be of the same rating even though available adapters allow connector bodies to be connected to a plug of a larger rating. For example, a 12 AWG conductor with an ampacity of 20 amperes could be connected to a 100-ampere circuit via an adapter. An overload could result in a fire because the circuit breaker or fuse would not provide adequate protection.

(C) Conductor Type. Conductors for adapters and two-fers shall be listed extra-hard usage or listed hard usage (junior hard service) cord. Hard usage (junior hard service) cord shall be restricted in overall length to 2.0 m (6.6 ft).

Part VI. Dressing Rooms, Dressing Areas, and Makeup Areas.

520.71 Pendant Lampholders. Pendant lampholders shall not be installed in dressing or makeup rooms.

520.72 Lamp Guards. All exposed lamps in dressing or makeup areas including rooms where they are less than 2.5 m (8 ft) from the floor shall be equipped with open-end guards riveted to the outlet box cover or otherwise sealed or locked in place. Recessed lamps shall not be required to be equipped with guards.

Lamps in dressing rooms are required to be provided with suitable open-end guards that permit relamping and that are not easily removed. Guards make it difficult to circumvent their purpose of preventing contact between the lamps and flammable materials.

520.73 Switches Required. All luminaires, lampholders, and any receptacles adjacent to the mirror(s) and above the dressing or makeup counter(s) installed in dressing or makeup rooms shall be controlled by wall switches installed in the dressing or makeup room(s). Other outlets installed in the dressing or makeup rooms shall not be required to be switched.

520.74 Pilot Lights Required. Each switch required in 520.73 shall be provided with a pilot light located outside of and adjacent to the door of the room being controlled to indicate when the circuit is energized. Each pilot light shall be permanently identified indicating a description of the circuit controlled. Pilot lights shall be neon, LED, or other extended-life lamp. Pilot lights shall be recessed or provided with a mechanical guard.

Part VII. Equipment Grounding Conductor

520.81 Equipment Grounding Conductor. All metal raceways and metal-sheathed cables shall be connected to an equipment grounding conductor. The metal frames and enclosures of all equipment, including border lights and portable luminaires, shall be connected to an equipment grounding conductor.

ARTICLE 522

Control Systems for Permanent Amusement Attractions

Part I. General

522.1 Scope. This article covers the installation of control circuit power sources and control circuit conductors for electrical equipment, including associated control wiring in or on all structures, that are an integral part of a permanent amusement attraction.

Article 522 provides requirements for permanent amusement attractions and theme parks. Article 525 applies to temporary attractions, such as carnivals, circuses, and fairs, where most of the attractions consist of portable modules that are moved from place to place. In contrast, theme parks are permanent facilities that have entertainment features fixed in place so that they are not readily portable. In the United States, approximately 475 amusement and theme parks operate a wide variety of permanent entertainment features.

Article 522 addresses the unique applications and installations utilized in the theme park and amusement industry and covers the wiring requirements for the control circuit power source and control circuit conductors, allowing for installation methods that are not recognized in the requirements of Articles 724 and 725. The control voltage used is a maximum of 150 volts ac to ground or 300 volts dc to ground.

522.5 Voltage Limitations. Control voltage shall be a maximum of 150 volts, nominal, ac to ground or 300 volts dc to ground.

522.7 Maintenance. The conditions of maintenance and supervision shall ensure that only qualified persons service the permanent amusement attraction.

Part II. Control Circuits

522.10 Power Sources for Control Circuits.

(A) Power-Limited Control Circuits. Power-limited control circuits shall be supplied from a source that has a rated output of not more than 30 volts and 1000 volt-amperes.

(1) Control Transformers. Transformers used to supply power-limited control circuits shall comply with the applicable sections within Parts I and II of Article 450.

(2) Other Power-Limited Control Power Sources. Power-limited control power sources, other than transformers, shall be protected by overcurrent devices rated at not more than 167 percent of the volt-ampere rating of the source divided by the rated voltage. The fusible overcurrent devices shall not be interchangeable with fusible overcurrent devices of higher ratings. The overcurrent device shall be permitted to be an integral part of the power source.

To comply with the 1000 volt-ampere limitation of 522.10(A), the maximum output of power sources, other than transformers, shall be limited to 2500 volt-amperes, and the product of the maximum current and maximum voltage shall not exceed 10,000 volt-amperes. These ratings shall be determined with any overcurrent-protective device bypassed.

(B) Non–Power-Limited Control Circuits. Non–power-limited control circuits shall not exceed 300 volts. The power output of the source shall not be required to be limited.

(1) Control Transformers. Transformers used to supply non–power-limited control circuits shall comply with the applicable sections within Parts I and II of Article 450.

(2) Other Non–Power-Limited Control Power Sources. Non–power-limited control power sources, other than transformers, shall be protected by overcurrent devices rated at not more than 125 percent of the volt-ampere rating of the source divided by the rated voltage. The fusible overcurrent devices shall not be interchangeable with fusible overcurrent devices of higher ratings. The overcurrent device shall be permitted to be an integral part of the power source.

Part III. Control Circuit Wiring Methods

522.20 Conductors, Busbars, and Slip Rings. Insulated control circuit conductors shall be copper and shall be permitted to be stranded or solid. Listed multiconductor cable assemblies shall be permitted.

Exception No. 1: Busbars and slip rings shall be permitted to be materials other than copper.

Exception No. 2: Conductors used as specific-purpose devices, such as thermocouples and resistive thermal devices, shall be permitted to be materials other than copper.

522.21 Conductor Sizing.

(A) Conductors Within a Listed Component or Assembly. Conductors of size 30 AWG or larger shall be permitted within a listed component or as part of the wiring of a listed assembly.

(B) Conductors Within an Enclosure or Operator Station. Conductors of size 30 AWG or larger shall be permitted in a listed and jacketed multiconductor cable within an enclosure or operator station. Conductors in a non-jacketed multiconductor cable, such as ribbon cable, shall not be smaller than 26 AWG. Single conductors shall not be smaller than 24 AWG.

Exception: Single conductors 30 AWG or larger shall be permitted for jumpers and special wiring applications.

(C) Conductors Outside of an Enclosure or Operator Station. The size of conductors in a listed and jacketed, multiconductor cable shall not be smaller than 26 AWG. Single conductors shall not be smaller than 18 AWG and shall be installed only where part of a recognized wiring method of Chapter 3.

522.22 Conductor Ampacity. Ampacities for conductors sized 16 AWG and smaller shall be as specified in Table 522.22.

Δ ***TABLE 522.22*** *Conductor Ampacity Based on Copper Conductors with 60°C and 75°C Insulation in an Ambient Temperature of 30°C*

Conductor Size (AWG)	Ampacity	
	60°C	75°C
30	–	0.5
28	–	0.8
26	–	1
24	2	2
22	3	3
20	5	5
18	7	7
16	10	10

Notes:
1. For ambient temperatures other than 30°C, temperature correction factors provided in 310.15(B)(1) shall be used.
2. Ampacity for conductors with 90°C or greater insulation shall be based on ampacities in the 75°C column.

522.23 Overcurrent Protection for Conductors. Conductors 30 AWG through 16 AWG shall have overcurrent protection in accordance with the appropriate conductor ampacity in Table 522.22. Conductors larger than 16 AWG shall have overcurrent protection in accordance with the appropriate conductor ampacity in Table 310.16.

522.24 Conductors of Different Circuits in the Same Cable, Cable Tray, Enclosure, or Raceway. Control circuits shall be permitted to be installed with other circuits as specified in 522.24(A) and (B).

(A) Two or More Control Circuits. Control circuits shall be permitted to occupy the same cable, cable tray, enclosure, or raceway without regard to whether the individual circuits are alternating current or direct current, provided all conductors are insulated for the maximum voltage of any conductor in the cable, cable tray, enclosure, or raceway.

(B) Control Circuits with Power Circuits. Control circuits shall be permitted to be installed with power conductors as specified in 522.24(B)(1) through (B)(3).

(1) In a Cable, Enclosure, or Raceway. Control circuits and power circuits shall be permitted to occupy the same cable, enclosure, or raceway only where the equipment powered is functionally associated.

(2) In Factory- or Field-Assembled Control Centers. Control circuits and power circuits shall be permitted to be installed in factory- or field-assembled control centers.

(3) In a Manhole. Control circuits and power circuits shall be permitted to be installed as underground conductors in a manhole in accordance with one of the following:

(1) The power or control circuit conductors are in a metal-enclosed cable or Type UF cable
(2) The conductors are permanently separated from the power conductors by a continuous fixed nonconductor, such as flexible tubing, in addition to the insulation on the wire
(3) The conductors are permanently and effectively separated from the power conductors and securely fastened to racks, insulators, or other approved supports
(4) In cable trays, where the control circuit conductors and power conductors not functionally associated with them are separated by a solid fixed barrier of a material compatible with the cable tray, or where the power or control circuit conductors are in a metal-enclosed cable

522.25 Ungrounded Control Circuits. Separately derived ac circuits and systems 50 volts or greater and 2-wire dc circuits and systems 60 volts or greater shall be permitted to be ungrounded, provided that all the following conditions are met:

(1) Continuity of control power is required for orderly shutdown.
(2) Ground detectors are installed on the control system.

522.28 Control Circuits in Wet Locations. Where wet contact is likely to occur, ungrounded 2-wire direct-current control circuits shall be limited to 30 volts maximum for continuous dc or 12.4 volts peak for direct current that is interrupted at a rate of 10 to 200 Hz.

ARTICLE 525

Carnivals, Circuses, Fairs, and Similar Events

Δ Part I. General

525.1 Scope. This article covers the installation of portable wiring and equipment for carnivals, circuses, fairs, and similar functions, including wiring in or on all structures.

Article 525 addresses the installation of portable wiring and equipment for temporary attractions, such as carnivals, circuses, and fairs. Article 525 is intended to apply to all wiring in or on portable structures, whereas Articles 518, 520, and 522 apply to permanent structures.

525.3 Other Articles.

(A) Portable Wiring and Equipment. Wherever the requirements of other articles of this *Code* and Article 525 differ, the requirements of Article 525 shall apply to the portable wiring and equipment.

(B) Attractions Utilizing Pools, Fountains, and Similar Installations with Contained Volumes of Water. This equipment shall be installed to comply with the applicable requirements of Parts I, II, III, and V of Article 680.

525.5 Overhead Conductor Clearances.

(A) Vertical Clearances. Conductors shall have a vertical clearance to ground in accordance with 225.18. These clearances shall apply only to wiring installed outside of tents and concessions.

(B) Clearance to Portable Structures.

(1) 600 Volts (or Less). Portable structures shall be maintained not less than 4.5 m (15 ft) in any direction from overhead conductors operating at 600 volts or less, except for the conductors supplying the portable structure. Portable structures included in 525.3(B) shall comply with Table 680.9(A).

(2) Over 600 Volts. Portable structures shall not be located under or within a space that is located 4.5 m (15 ft) horizontally and extending vertically to grade of conductors operating in excess of 600 volts.

Portable structures, which include rides, attractions, and vendor booths, are not permitted in the area that extends 15 feet horizontally from the overhead conductors and down to grade level. Exhibit 525.1 depicts the restricted area.

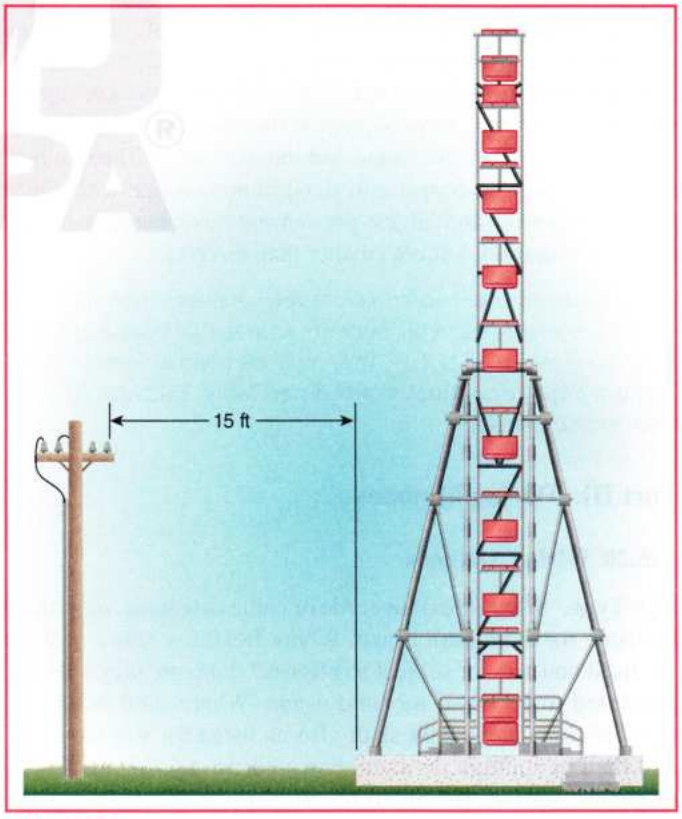

EXHIBIT 525.1 The separation distance required around overhead conductors.