

## Chapter 39

# DEVICES AND LUMINAIRES

### SECTION E3901 SWITCHES

**E3901.1 Rating and application of snap switches.** General-use snap switches shall be used within their ratings and shall control only the following loads:

1. Resistive and inductive loads, including electric-discharge lamps, not exceeding the ampere rating of the switch at the voltage involved.
2. Tungsten-filament lamp loads not exceeding the ampere rating of the switch at 120 volts.
3. Motor loads not exceeding 80 percent of the ampere rating of the switch at its rated voltage.

**E3901.2 CO/ALR snap switches.** Snap switches rated 20 amperes or less directly connected to aluminum conductors shall be marked CO/ALR.

**E3901.3 Indicating.** General-use and motor-circuit switches and circuit breakers shall clearly indicate whether they are in the open OFF or closed ON position. Where single-throw switches or circuit breaker handles are operated vertically rather than rotationally or horizontally, the up position of the handle shall be the ON position.

**E3901.4 Time switches and similar devices.** Time switches and similar devices shall be of the enclosed type and shall be mounted in cabinets or boxes or equipment enclosures. A barrier shall be used around energized parts to prevent operator exposure when making manual adjustments or switching.

**E3901.5 Grounding of enclosures.** Metal enclosures for switches or circuit breakers shall be grounded. Where nonmetallic enclosures are used with metal raceways or metal-armored cables, provisions shall be made for maintaining grounding continuity.

Metal boxes for switches shall be effectively grounded. Nonmetallic boxes for switches shall be installed with a wiring method that provides or includes an equipment grounding conductor.

**E3901.6 Access.** All switches and circuit breakers used as switches shall be located to allow operation from a readily accessible location. Such devices shall be installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, will not be more than 6 feet 7 inches (2007 mm) above the floor or working platform.

**E3901.7 Wet locations.** A switch or circuit breaker located in a wet location or outside of a building shall be enclosed in a weatherproof enclosure or cabinet. Switches shall not be installed within wet locations in tub or shower spaces unless installed as part of a listed tub or shower assembly.

**E3901.8 Grounded conductors.** Switches or circuit breakers shall not disconnect the grounded conductor of a circuit except where the switch or circuit breaker simultaneously disconnects all conductors of the circuit.

**E3901.9 Switch connections.** Three- and four-way switches shall be wired so that all switching occurs only in the ungrounded circuit conductor. Color coding of switch connection conductors shall comply with Section E3307.4. Where in metal raceways or metal-jacketed cables, wiring between switches and outlets shall be in accordance with section 3306.7.

**Exception:** Switch loops do not require a grounded conductor.

**E3901.10 Box mounted.** Flush-type snap switches mounted in boxes that are recessed from the wall surfaces as covered in Section E306.5 shall be installed so that the extension plaster ears are seated against the surface of the wall. Flush-type snap switches mounted in boxes that are flush with the wall surface of a project therefrom shall be installed so that the mounting yoke or strap of the switch is seated against the box.

**E3901.11 Snap switch faceplates.** Snap switches mounted in boxes shall have face plates installed so as to completely cover the opening and seat against the finished surface.

**E3901.11.1 Faceplate grounding.** Snap switches, including dimmer switches, shall be effectively grounded and shall provide a means to ground metal face plates, whether or not a metal faceplate is installed. Snap switches shall be considered effectively grounded where either of the following conditions are met:

1. The switch is mounted with metal screws to a metal box or to a nonmetallic box with integral means for grounding devices.
2. An equipment grounding conductor or equipment bonding jumper is connected to an equipment grounding termination of the snap switch.

### SECTION E3902 RECEPTACLES

**E3902.1 Rating and type.** Receptacles installed for the attachment of portable cords shall be rated at not less than 15 amperes, 125 volts, or 15 amperes, 250 volts, and shall not be a lampholder type. Receptacles shall be rated in accordance with this section.

**E3902.1.1 Single receptacle.** A single receptacle installed on an individual branch circuit shall have an ampere rating not less than that of the branch circuit.

**E3902.1.2 Two or more receptacles.** Where connected to a branch circuit supplying two or more receptacles or out-

lets, receptacles shall conform to the values listed in Table E3902.1.2.

**TABLE E3902.1.2**  
**RECEPTACLE RATINGS FOR VARIOUS SIZE**  
**MULTIOUTLET CIRCUITS**

CIRCUIT RATING (amperes)	RECEPTACLE RATING (amperes)
15	15
20	15 or 20
30	30
40	40 or 50
50	50

**E3902.2 Grounding type.** Receptacles installed on 15- and 20-ampere-rated branch circuits shall be of the grounding type.

**E3902.3 CO/ALR receptacles.** Receptacles rated at 20 amperes or less and directly connected to aluminum conductors shall be marked CO/ALR.

**E3902.4 Faceplates.** Metal face plates shall be grounded.

**E3902.5 Position of receptacle faces.** After installation, receptacle faces shall be flush with or project from face plates of insulating material and shall project a minimum of 0.015 inch (0.381 mm) from metal face plates. Face plates shall be installed so as to completely cover the opening and seat against the mounting surface.

**E3902.6 Receptacle mounted in boxes.** Receptacles mounted in boxes that are set back of the wall surface shall be installed so that the mounting yoke or strap of the receptacle is held rigidly at the surface of the wall. Receptacles mounted in boxes that are flush with the wall surface or project therefrom shall be so installed that the mounting yoke or strap is seated against the box or raised cover.

**E3902.7 Receptacles mounted on covers.** Receptacles mounted to and supported by a cover shall be secured by more than one screw or shall be a device assembly or box cover listed and identified for securing by a single screw.

**E3902.8 Damp locations.** A receptacle installed outdoors in a location protected from the weather or in other damp locations shall have an enclosure for the receptacle that is weatherproof when the receptacle cover(s) is closed and an attachment plug cap is not inserted. An installation suitable for wet locations shall also be considered suitable for damp locations. A receptacle shall be considered to be in a location protected from the weather where located under roofed open porches, canopies and similar structures and not subject to rain or water runoff.

**E3902.9 Wet locations.** Where a receptacle is installed in a wet location and where the product intended to be plugged into it is not attended while in use, the receptacle shall have an enclosure that is weatherproof both when the attachment plug cap is inserted and when it is removed. Where a receptacle is installed in a wet location and where the product intended to be plugged into it will be attended while in use, the receptacle shall have an enclosure that is weatherproof when the attachment plug cap is removed.

**E3902.10 Bathtub and shower space.** A receptacle shall not be installed within a bathtub or shower space.

**E3902.11 Flush mounting with faceplate.** In damp or wet locations, the enclosure for a receptacle installed in an outlet box flush-mounted on a wall surface shall be made weatherproof by means of a weatherproof faceplate assembly that provides a water-tight connection between the plate and the wall surface.

**E3902.12 Outdoor installation.** A receptacle outlet installed outdoors shall be located so that water accumulation is not likely to contact the outlet cover or plate.

## SECTION E3903 FIXTURES

**E3903.1 Energized parts.** Luminaires, lampholders, lamps and receptacles shall not have energized parts normally exposed to contact.

**E3903.2 Luminaires near combustible material.** Luminaires shall be installed so that combustible material will not be subjected to temperatures in excess of 90°C (194°F).

**E3903.3 Exposed conductive parts.** The exposed conductive parts of luminaires and equipment directly wired or attached to outlets shall be grounded. Lamp tie wires, mounting screws, clips and decorative bands on glass spaced at least 1.5 inches (38 mm) from lamp terminals shall not be required to be grounded.

**E3903.4 Screw-shell type.** Lampholders of the screw-shell type shall be installed for use as lampholders only.

**E3903.5 Recessed incandescent luminaires.** Recessed incandescent luminaires shall have thermal protection and shall be listed as thermally protected.

### Exceptions:

1. Thermal protection shall not be required in recessed luminaires listed for the purpose and installed in poured concrete.
2. Thermal protection shall not be required in recessed luminaires having design, construction, and thermal performance characteristics equivalent to that of thermally protected luminaires, and such luminaires are identified as inherently protected.

**E3903.6 Thermal protection.** The ballast of a fluorescent luminaires installed indoors shall have integral thermal protection. Replacement ballasts shall also have thermal protection integral with the ballast. A simple reactance ballast in a fluorescent luminaire with straight tubular lamps shall not be required to be thermally protected.

**E3903.7 High-intensity discharge luminaires.** Recessed high-intensity luminaires designed to be installed in wall or ceiling cavities shall have thermal protection and be identified as thermally protected. Thermal protection shall not be required in recessed high-intensity luminaires having design, construction and thermal performance characteristics equivalent to that of thermally protected luminaires, and such lumin-

aires are identified as inherently protected. Thermal protection shall not be required in recessed high-intensity discharge luminaires installed in and identified for use in poured concrete. A recessed remote ballast for a high-intensity discharge luminaire shall have thermal protection that is integral with the ballast and shall be identified as thermally protected.

**E3903.8 Wet or damp locations.** Luminaires installed in wet or damp locations shall be installed so that water cannot enter or accumulate in wiring compartments, lampholders or other electrical parts. All luminaires installed in wet locations shall be marked **SUITABLE FOR WET LOCATIONS**. All luminaires installed in damp locations shall be marked **SUITABLE FOR WET LOCATIONS** or **SUITABLE FOR DAMP LOCATIONS**.

**E3903.9 Lampholders in wet or damp locations.** Lampholders installed in wet or damp locations shall be of the weatherproof type.

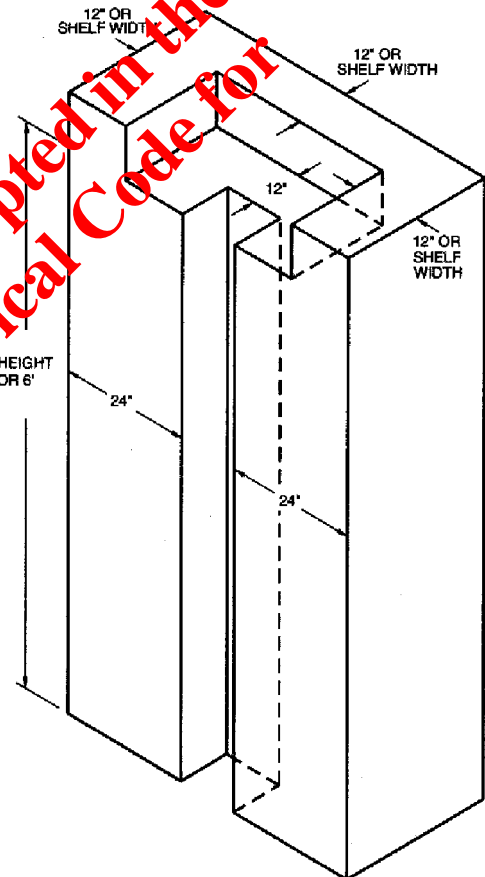
**E3903.10 Bathtub and shower areas.** Cord-connected luminaires, hanging luminaires, lighting track, pendants, and ceiling-suspended paddle fans shall not have any parts located within a zone measured 3 feet (914 mm) horizontally and 8 feet (2438 mm) vertically from the top of a bathtub rim or shower stall threshold. This zone is all encompassing and includes the zone directly over the tub or shower.

**E3903.11 Luminaires in clothes closets.** For the purposes of this section, storage space shall be defined as a volume bounded by the sides and back closet walls and planes extending from the closet floor vertically to a height of 6 feet (1829 mm) or the highest clothes-hanging rod and parallel to the walls at a horizontal distance of 24 inches (610 mm) from the sides and back of the closet walls respectively, and continuing vertically to the closet ceiling parallel to the walls at a horizontal distance of 12 inches (305 mm) or the width of the shelf, whichever is greater. For a closet that permits access to both sides of a hanging rod, the storage space shall include the volume below the highest rod extending 12 inches (305 mm) on either side of the rod on a plane horizontal to the floor extending the entire length of the rod (see Figure E3903.11).

The types of luminaires installed in clothes closets shall be limited to surface-mounted or recessed incandescent luminaires with completely enclosed lamps, and surface-mounted or recessed fluorescent luminaires. Incandescent luminaires with open or partially enclosed lamps and pendant luminaires or lamp-holders shall be prohibited. Luminaire installations shall be in accordance with one or more of the following:

1. Surface-mounted incandescent luminaires shall be installed on the wall above the door or on the ceiling, provided there is a minimum clearance of 12 inches (305 mm) between the fixture and the nearest point of a storage space.
2. Surface-mounted fluorescent luminaires shall be installed on the wall above the door or on the ceiling, provided there is a minimum clearance of 6 inches (152 mm) between the fixture and the nearest point of a storage space.

3. Recessed incandescent luminaires with a completely enclosed lamp shall be installed in the wall or the ceiling provided there is a minimum clearance of 6 inches (152 mm) between the luminaire and the nearest point of a storage space.
4. Recessed fluorescent luminaires shall be installed in the wall or on the ceiling provided there is a minimum clearance of 6 inches (152 mm) between the fixture and the nearest point of a storage space.



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

**FIGURE E3903.11**  
**CLOSET STORAGE SPACE**

**E3903.12 Luminaire wiring—general.** Wiring within luminaires or luminaire canopies shall not be exposed to physical damage. Conductors shall be arranged so that they are not subjected to temperatures above those for which the conductors are rated.

**E3903.12.1 Polarization of luminaires.** Luminaires shall be wired so that the screw shells of lampholders will be connected to the same luminaire or circuit conductor or terminal. The grounded conductor shall be connected to the screw shell.

**E3903.12.2 Luminaires as raceways.** Luminaires shall not be used as raceways for circuit conductors except where such luminaires are listed for the purpose.

## SECTION E3904 LUMINAIRE INSTALLATION

**E3904.1 Outlet box covers.** In a completed installation, each outlet box shall be provided with a cover except where covered by means of a luminaire canopy, lampholder or device with a faceplate.

**E3904.2 Combustible material at outlet boxes.** Combustible wall or ceiling finish exposed between the inside edge of a luminaire canopy or pan and the outlet box to which the luminaire connects shall be covered with a noncombustible material.

**E3904.3 Access.** Luminaires shall be installed so that the connections between the luminaire conductors and the circuit conductors can be accessed without requiring the disconnection of any part of the wiring.

**E3904.4 Supports.** Luminaires and lampholders shall be securely supported. A luminaire that weighs more than 6 pounds (2.72 kg) or exceeds 16 inches (406 mm) in any dimension shall not be supported by the screw shell of a lampholder.

**E3904.5 Means of support.** Outlet boxes or fittings installed as required by Sections E3805 and E3806 shall be permitted to support luminaires weighing 50 pounds (22.7 kg) or less. A luminaire that weighs more than 50 pounds (22.7 kg) shall be supported independently of an outlet box except where the outlet box is listed for the weight to be supported.

**E3904.6 Exposed ballasts.** Luminaires having exposed ballasts or transformers shall be installed so that such ballasts or transformers are not in contact with combustible material.

**E3904.7 Combustible low-density cellulose fiberboard.** Where a surface-mounted luminaire containing a ballast is installed on combustible low-density cellulose fiberboard, the luminaire shall be listed for the purpose or it shall be spaced not less than 1/2 inches (38 mm) from the surface of the fiberboard. Where such luminaires are partially or wholly recessed, the provisions of Sections E3904.8 and E3904.9 shall apply.

**E3904.8 Recessed luminaire clearance.** A recessed luminaire that is not identified for contact with insulation shall have all recessed parts spaced at least 0.5 inch (12.7 mm) from combustible materials. The points of support and the finish trim parts at the opening in the ceiling or wall surface shall be permitted to be in contact with combustible materials. A recessed luminaire that is identified for contact with insulation, Type IC, shall be permitted to be in contact with combustible materials at recessed parts, points of support, and portions passing through the building structure and at finish trim parts at the opening in the ceiling or wall.

**E3904.9 Recessed luminaire installation.** Thermal insulation shall not be installed above a recessed luminaire or within

3 inches (76 mm) of the recessed luminaire's enclosure, wiring compartment or ballast except where such luminaire is identified for contact with insulation, Type IC.

## SECTION E3905 TRACK LIGHTING

**E3905.1 Installation.** Lighting track shall be permanently installed and permanently supplied by a branch circuit having a rating not more than that of the track.

**E3905.2 Fittings.** Fittings identified for use on lighting track shall be designed specifically for the track on which they are to be installed. Fittings shall be securely fastened to the track, shall maintain polarization and grounding, and shall be designed to be suspended directly from the track. Only lighting track fittings shall be installed on lighting track. Lighting track fittings shall not be equipped with general-purpose receptacles.

**E3905.3 Connected load.** The connected load on lighting tracks shall not exceed the rating of the track.

**E3905.4 Prohibited locations.** Lighting track shall not be installed in the following locations:

1. Where likely to be subjected to physical damage.
2. In wet or damp locations.
3. Where subject to corrosive vapors.
4. In storage battery rooms.
5. In hazardous (classified) locations.
6. Where concealed.
7. Where extended through walls or partitions.
8. Less than 5 feet (1524 mm) above the finished floor except where protected from physical damage or the track operates at less than 30 volts rms open-circuit voltage.
9. Within the zone measured 3 feet (900 mm) horizontally and 8 feet (2438 mm) vertically from the top of a bathtub rim.

**E3905.5 Fastening.** Lighting track shall be securely mounted so that each fastening will be suitable for supporting the maximum weight of luminaires that can be installed. Except where identified for supports at greater intervals, a single section 4 feet (1219 mm) or shorter in length shall have two supports and, where installed in a continuous row, each individual section of not more than 4 feet (1219 mm) in length shall have one additional support.

**E3905.6 Grounding.** Lighting track shall be grounded in accordance with Chapter 38, and the track sections shall be securely coupled to maintain continuity of the circuitry, polarization and grounding throughout.