

Chapter I

General Requirements

General Requirements (Article 110)

The first requirement of the *National Electrical Code* is that all installations must be performed “in a neat and workman-like manner.” In other words, all electrical installation requirements presuppose an installer who is concerned, informed, and thinking. Without this prerequisite, any other requirements are close to worthless. This requirement gives the inspector a lot of discretion to make broad interpretations. And as unpleasant as that can be at times, it is necessary. Even as comprehensive as the *Code* is, it cannot encompass all human actions. So, the inspector must have some room for judgment based upon circumstances.

Basic Requirements (Article 110)

Every electrical installer should periodically review the following basic requirements:

- All unused openings in boxes, cabinets, etc., must be filled.

- All equipment must be securely mounted. Wooden plugs in masonry are not allowed.

- Panelboards and other exposed buswork must be protected from paint, plaster, or other similar materials during the construction process.

- Conductors in manholes must be racked to provide a reasonable amount of access space.

- Free circulation of air around electrical equipment, especially equipment that requires such air flow for sufficient heat removal, can't be obstructed.

- All electrical connections *must* be made with devices that are listed and clearly marked as suitable for the intended use.

- Conductors must be spliced with suitable splicing devices, or by soldering, brazing, or welding. Soldered splices must first be joined, so that the splice is not dependent on the solder for mechanical or electrical strength. All splices must be covered with insulation equivalent to that of the conductors.

- Wire connectors (lugs, wire nuts, etc.) must be rated no lower than the operating temperature of the conductors with which they are used.

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A reasonable amount of working space must be provided around all electrical equipment. Generally, the minimum is 3 feet. *Table 110.26(A)(1)* shows specific requirements.

Lighting, enough to work on the equipment, must be provided in the areas around electrical equipment.

Except for panels of 200 amps or less in dwelling units, there must be a minimum head space in front of electrical panels of 7 feet.

All live parts operating at over 50 volts must be guarded against accidental contact by persons or objects. See *Section 110.31* for operation at over 600 volts. This is most often accomplished by:

- Locating the equipment in a room that is accessible only to qualified persons.

- Installing permanent and effective partitions or screens.

- Locating the equipment on a balcony or platform that will exclude unqualified persons.

- Locating the equipment 8 feet or more from the floor.

Guards must be installed to protect electrical equipment from physical damage where necessary.

Entrances to rooms or areas where there are live parts must have a sign posted forbidding unqualified persons from entering.

All disconnecting means (service, feeder, or branch circuit) must be marked, showing the purpose. This is not required if the purpose of the disconnecting means is obvious.

Exposed parts of high- and medium-voltage systems must have adequate clearance above working spaces. *Table 110.34(E)* in the *NEC* lists these distances.

Use of Grounded Conductors (Article 200)

All premises wiring systems must have a grounded conductor, except where the *NEC* specifically permits otherwise.

A grounded conductor must have insulation that is equal to that of any ungrounded conductors it is used with.

A grounded premises wiring system must receive its power from a grounded supply system.

A grounded conductor No. 6 or smaller must be covered with white or natural gray insulation (Figure 1.1), except:

1. Fixture wires.

2. Aerial cables can use a ridge on the grounded conductor, rather than a different color of insulation.
3. Where only qualified persons will have access to the conductors, colored conductors can be taped or painted white or gray at their terminations.
4. Grounded conductors in MI cables can be identified otherwise.

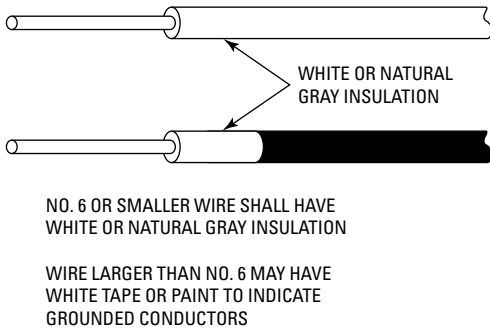


Figure I.1 Method of identifying grounded conductors.

Grounded conductors No. 4 or larger can be identified either by having white or gray insulation, by having three longitudinal stripes 120 degrees apart, or by having a white marking at terminations.

If grounded conductors of different systems are installed in common boxes, raceways, etc., the first system must be marked as above, the second system's grounded conductor must be identified by having white insulation with a colored (but *not* green)

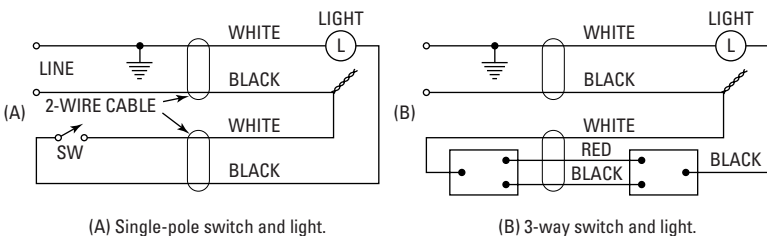


Figure I.2 Method of connecting a common light and switch.

tracer, and any other systems must have their own means of identification.

Cables to switches can use the grounded (white) conductor to bring power to the switch, but not *from* the switch (Figure 1.2).

Terminals used specifically for grounding conductors must be identified by a color sufficiently different from that used for other terminals.

For devices with screwshells, the grounded conductor must be connected to the screwshell, not to the tab, as shown in Figure 1.3.

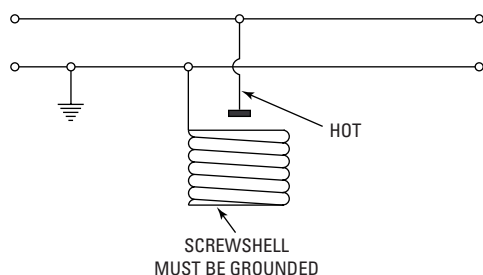


Figure 1.3 Grounding of a screwshell base.