

(A) Terminals. Connection of conductors to terminal parts shall ensure a mechanically secure electrical connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors.

Terminals for more than one conductor and terminals used to connect aluminum shall be so identified.

(B) Splices. Conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined so as to be mechanically and electrically secure without solder and then be soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an identified insulating device.

Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

Electrical connection failures are the cause of many equipment burn-outs and fires. Many of these failures are attributable to improper terminations, poor workmanship, the differing characteristics of dissimilar metals, and improper binding screws or splicing devices.

UL's requirements for listing solid aluminum conductors in 12 AWG and 10 AWG and its requirements for listing snap switches and receptacles for use on 15- and 20-ampere branch circuits incorporate stringent tests that are intended to prevent termination failures. Screwless pressure terminal connectors of the conductor push-in type are for use only with 14 AWG solid copper conductors.

See also

404.14(C) and **406.3(C)** for further information regarding receptacles and switches using copper-aluminum, revised (CO/ALR) rated terminals

The electrical industry has developed new product and material designs that provide increased levels of safety for aluminum wire terminations. See the accompanying Aluminum Wire Terminations feature.

CLOSER LOOK: Aluminum Wire Terminations

For New Installations

The following commentary is based on a report prepared by the Ad Hoc Committee on Aluminum Terminations prior to publication of the 1975 NEC. This information is still pertinent today and is necessary for compliance with 110.14(A) when aluminum wire is used in new installations. New installation of aluminum conductors on 15- and 20-ampere branch circuits is not common, but many of these circuits continue to be in use.

New Materials and Devices

For direct connection, only 15- and 20-ampere receptacles and switches marked "CO/ALR" and connected as follows should be used. The "CO/ALR" marking on the device mounting yoke or strap means the devices have been tested to stringent heat-cycling requirements to determine their suitability for use with UL-labeled aluminum, copper, or copper-clad aluminum wire.

Listed solid aluminum wire, 12 AWG or 10 AWG, marked with the aluminum insulated wire label should be used. The installation instructions that are packaged with the wire should be followed.

Installation Method

Exhibit 110.2 illustrates the following correct method of connection:

1. The freshly stripped end of the wire is wrapped two-thirds to three-quarters of the distance around the wire-binding screw post as shown in Step A. The loop is made so that rotation of the screw during tightening will tend to wrap the wire around the post rather than unwrap it.
2. The screw is tightened until the wire is snugly in contact with the underside of the screw head and with the contact plate on the wiring device as shown in Step B.

3. The screw is tightened an additional half-turn to provide a firm connection as shown in Step C.
4. The wires should be positioned behind the wiring device to decrease the likelihood of the terminal screws loosening when the device is positioned into the outlet box.

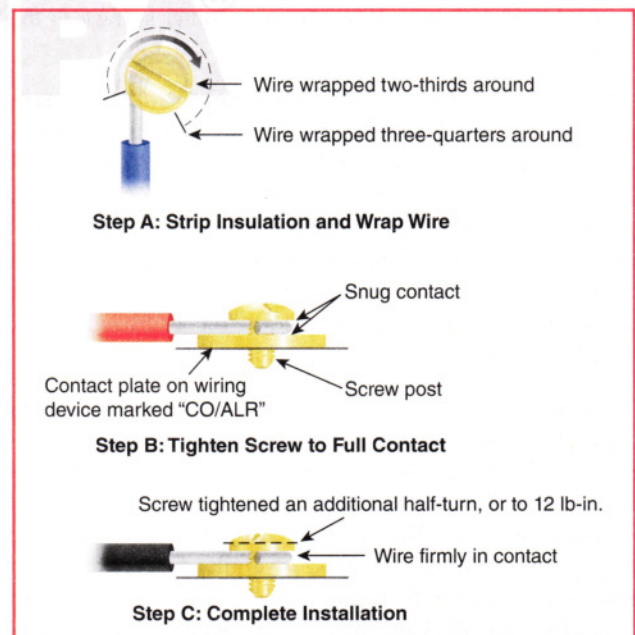


EXHIBIT 110.2 Correct method of terminating aluminum wire at wire-binding screw terminals of receptacles and snap switches.