

BULLETIN

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Copper-Clad Aluminum Conductor Requirements in the National Electrical Code

➤ What is a copper-clad aluminum conductor?

The 2020 National Electrical Code (NEC) defines copper-clad aluminum conductors as: *“Conductors drawn from a copper-clad aluminum rod, with the copper metallurgically bonded to an aluminum core, where the copper forms a minimum of 10 percent of the cross-sectional area of a solid conductor or each strand of a stranded conductor.”*

➤ Does the NEC permit the installation of copper-clad aluminum conductors?

Yes. Section 110.5 of the 2020 NEC states: *“Conductors used to carry current shall be of copper, aluminum, or copper-clad aluminum unless otherwise provided in this Code”*. Additionally, Section 310.3 of the 2020 NEC states: *“Conductors in this article shall be of aluminum, copper-clad aluminum, or copper unless otherwise specified”*.

➤ Should copper-clad aluminum conductors be considered a dissimilar metal when making electrical connections?

Copper-clad aluminum conductors are considered similar to copper, brass or zinc plated steel in that similar metals can be terminated together without oxide inhibitors in dry locations. Like copper conductors, copper-clad aluminum conductors are considered dissimilar to aluminum conductors and should be connected together with the application of an oxide inhibitor and a connector specifically listed for the intermixed metals. These statements are supported by Section 110.14 of the 2020 NEC that states: *“Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors (such as copper and aluminum or aluminum and copper-clad aluminum), unless the device is identified for the purpose and conditions of use”*.

➤ Are the ampacities the same for copper and copper-clad aluminum conductors of the same AWG size?

No, the ampacities for conductors are determined in accordance with 2020 NEC 310.14 and NEC Tables 310.16 and 310.17 for ampacity values at rated temperatures. Separate columns in the tables are provided for copper versus copper-clad aluminum and aluminum conductors. For example, a typical 15 ampere residential branch circuit would use 14 AWG copper or 12 AWG copper-clad aluminum.

Coordination with the overcurrent protective device for small conductors is found in NEC 240.4(D). Also, see NEC 110.14(C) for conductor temperature limitations due to termination provisions.

➤ **Can copper-clad aluminum conductors be terminated to a switch, such as general-use snap switches, dimmers, circuit breakers, or other switching/control devices? What about receptacles?**

Terminals of 15-ampere and 20-ampere snap switches and receptacles are for use with copper and copper-clad aluminum conductors only, unless marked "CO/ALR" which then allows for use with aluminum, copper and copper-clad aluminum conductors. Terminals of switches and receptacles rated 30-amperes and above are for use with copper conductors only, unless marked "AL/CU" that allows for use with aluminum, copper and copper-clad aluminum conductors. These statements are supported by Section 404.15(C) and 406.3(C) of the 2020 NEC and UL guide information for receptacles and snap switches in product categories RTRT and WJQR, respectively. The UL guide information can be found online in UL's Product iQ, formerly known as the UL White Book.

➤ **What wiring methods are permitted to utilize CCA conductors?**

1. **Individual conductors:** As noted above, Section 310.3(B) of the 2020 NEC permits copper-clad aluminum to be utilized for individual conductors. As an example, thermoplastic-insulated copper-clad aluminum conductors are listed in accordance with UL 83 in sizes from 12 AWG through 1,000 kcmil. Individual conductors for general wiring are required to be used as part of recognized NEC Chapter 3 wiring methods, such as raceways, cables, or cable trays.
2. **Metal-Clad Cable (Type MC):** Section 330.104 of the 2020 NEC permits copper-clad aluminum circuit and equipment grounding conductors to be utilized in Type MC cable in sizes no smaller than 12 AWG. For control and signal conductors, the minimum copper-clad aluminum conductor size is permitted to be 14 AWG. Type MC cable is required to be listed to UL 1569.
3. **Nonmetallic-Sheathed Cable (Type NM):** Section 334.104 of the 2020 NEC permits copper-clad aluminum conductors to be utilized in Type NM cable in sizes 12 AWG through 2 AWG. This includes circuit, equipment grounding, control, and signal conductors. Type NM cable is required to be listed to UL 719.
4. **Power and Control Tray Cable (Type TC):** Section 336.104 of the 2020 NEC permits copper-clad aluminum circuit and equipment grounding conductors to be utilized in type TC cables in sizes no smaller than 12 AWG. For control and signal conductors, the minimum copper-clad aluminum conductor size is permitted to be 14 AWG. Type TC cable is required to be listed to UL 1277.
5. **Underground Feeder and Branch-Circuit Cable (Type UF):** Section 340.104 of the 2020 NEC permits copper-clad aluminum conductors to be utilized in Type UF cable in sizes 12 AWG through 4/0 AWG. This includes circuit, equipment grounding, control, and signal conductors. Type UF cable is required to be listed to UL 493.

The sections of the code mentioned above cover the most commonly asked questions about copper-clad aluminum conductors from design professionals, installers, and authorities having jurisdiction. Manufacturer's installation instructions and product markings for the conductors, terminations, and equipment must also be followed to comply with the NEC. For additional guidance or other questions

on the selection, installation, or enforcement of NEC requirements related to copper-clad aluminum conductors, contact the manufacturer of the conductor or cable product.

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