

Copper-Clad Aluminum Conductor Requirements in the National Electrical Code

Overview

Designed to terminate with copper-only electrical circuit components as an electrical conductor material, Copper-Clad Aluminum bimetal is considered a “similar” metal to single-metal copper by the National Fire Protection Association (NFPA), the parent organization managing the National Electrical Code (NEC). This technical bulletin answers common questions posed by Authorities Having Jurisdiction, electrical design engineers, as well as electrical contractors. It summarizes the major references in the NEC for Copper-Clad Aluminum in terms of its definition, electrical connections, wiring methods and conductor materials.



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What is a copper-clad aluminum (CCA) 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 CCA 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.” Copper-clad aluminum conductors have been recognized for building wire since the 1971 NEC edition.

Should CCA conductors be considered a dissimilar metal when making electrical connections?

CCA conductors are not dissimilar to copper, brass or zinc plated steel and can be terminated without oxide inhibitors in dry locations. CCA conductors are dissimilar to aluminum conductors and should not be connected together without the application of an oxide inhibitor and with a connector specifically listed for the termination of dissimilar 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.”

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

Supply terminals of 15-ampere and 20-ampere switches and receptacles are for use with copper and copper-clad aluminum conductors only, unless marked “CO/ALR” 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” 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 the UL listing information for these devices.

What type of wiring methods are permitted to utilize CCA conductors?

- 1. Individual conductors:** As noted above, Section 310.3(B) of the 2020 NEC permits CCA to be utilized as individual conductors for general wiring. Thermoplastic-insulated CCA conductors listed in accordance with UL 83 are available from #12 AWG through 1,000 kcmil.
- 2. Metal-Clad Cable (Type MC):** Section 330.104 of the 2020 NEC permits CCA conductors to be utilized in Type MC cable in sizes no smaller than #12 AWG. Additionally, for control and signal conductors, the minimum conductor size shall be #14 AWG. Type MC cable shall be listed to UL 1569
- 3. Nonmetallic-Sheathed Cable (Type NM):** Section 334.104 of the 2020 NEC permits CCA conductors to be utilized in Type NM cable in sizes #12 AWG through 1,000 kcmil. Additionally, for control and signal conductors, the minimum conductor size shall be #14 AWG. Type NM cable shall be listed to UL 719.
- 4. Additional Wiring Methods:**
 - a. Medium Voltage Conductors and Cable per Section 311.12(B)
 - b. Power and Control Tray Cable (Type TC) per Section 336.104
 - c. Underground Feeder and Branch-Circuit Cable (Type UF) per Section 340.104

The 2020 NEC makes reference to CCA conductors not less than 75 times. The sections of the code mentioned above outline the most commonly asked questions about CCA conductors from design professionals, installers, and authorities having jurisdiction. The manufacturer's installation instructions and product markings 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 CCA conductors, contact the manufacturer of the conductor or cable product.

About the ABA

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The American Bimetallic Association (ABA) is an organization dedicated to advocating, advancing and safeguarding the use of bimetals. ABA advocates for codes and standards with Standards Making Organizations (“SMOs”) to expand the use of bimetals in the marketplace. ABA educates the public about the safety and performance advantages of bimetals over traditional single-metal solutions. ABA and each of its stakeholders seek to limit and slow the negative impact of inferior or substandard bimetals by setting the highest quality standards for bimetallic products.

Ensuring a Future for Bimetals

The safe-keeping of the bimetals industry is central to the ABA’s mission as counterfeiting and sub-standard products threaten to undermine the sector’s reputation and promise. Through education and the monitoring of industry-wide standards, the ABA provides the platform that allows bimetallic solutions to develop and reach market.

ABA membership represents a wide range of industries, making products that silently touch our lives in essential ways. From the circuit breakers protecting the welfare of our homes and workplaces, to the systems that create the images we see on television, to the manufacture of modern aircraft and automobiles, bimetals attract little attention but perform elemental roles in our common, everyday activities. As the global economy advances, our members continue to create new applications utilizing bimetals.

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