



TO: To Whom It May Concern

FROM: Paul W Abernathy, Manager of Codes and Standards

DATE: August 2020

RE: Aluminum Conductors, Aluminum Oxide and Termination Recommendations

There are basically two types of Surface Oxides that affect conductors and subsequently terminations. For copper it's copper oxide and for aluminum it's aluminum oxide.

The National Electrical Code® [NEC®] states in section 110.14 that the use of oxidation inhibitors is permitted for both Copper and Aluminum conductors as long as the compounds used do not have an adverse affect on the conductors. It is also important to understand that some inhibitors are designed specifically for aluminum while others are specific to copper so choosing an inhibitor that is compatible to the conductor material is very important and quite frankly what section 110.14 of the NEC® is demanding.

It is important to understand that aluminum oxide is not a concern within the conductor assembly itself regarding conductivity of the aluminum material because it lies just under the insulation and can serves as a protective top layer to the actual conductive material. However, if surface oxidation on any conductor (Copper or Aluminum) is observed, the contact resistance at terminations where the stripping and ultimate termination process will expose the conductors to atmospheric conditions for extended periods of time at vital connection points.

When employed on aluminum conductors, it is the recommendation of Encore Wire's Codes and Standards department to prep the exposed aluminum conductors for termination as followed and recommend the use of anti-oxidation compounds.

1. After stripping the insulation off of the aluminum conductor; take a wire brush or emery cloth and clean the entire surface of the exposed aluminum conductors.
2. Immediately apply a uniformed coating of a UL listed, anti-oxide inhibitor compound to the conductor to ensure a protective barrier to future oxidation at the contact points are minimized.
3. Terminate the conductor only in a terminal that is listed and identified for use with aluminum conductors. Properly torque the termination in accordance with UL 486A-B and/or NEC® Informative Annex I.

Note: If oxide inhibitor is not applied immediately after wire brushing the conductor, proceed back to item 1 and re-brush the conductor and continue to item 2.

In closing, it is important to understand that the NEC® provides no requirement to the direct use of oxidation inhibitors or compounds on Aluminum or Copper wire. Section 110.14 of the NEC® states, "Where employed, shall be suitable for the conductors, installation and equipment." If the electrical equipment's installation manual, which is part of it's UL listing, states the use of oxidation inhibitor is required then not using it so would be a violation of NEC® Section 110.3(B), which states you install the electrical equipment in accordance with the manufacturers listed instructions. If the manufacturer doesn't make such a statement, then the oxide inhibitor or anti- oxidation compounds are not required but are always highly recommended.

A handwritten signature in black ink, appearing to read "Paul W Abernathy".

Paul W Abernathy, CMI®, CMECP®
Manager of Codes and Standards
Encore Wire Corporation

NEC® NFPA70 Code Making Panel Member - Panel 5 and 17