Tinned Conductors

Author: Sy Shaheen

Published: March 1, 2019, 2:55 p.m.

In the early days of manufacturing power cable, conductor corrosion was an issue because the insulation and jacket compounds used back then contained sulfur as part of the curing process. The sulfur eventually would leach through onto the copper conductor forming corrosive copper sulfide. This phenomenon was especially a problem in 600V power cables where the insulation was in direct contact with the conductor. To combat this problem cable manufacturers turned to tinning the copper conductor to protect it from corrosion. There are two different processes to tin copper conductors, one is through electroplating and the other is through a tin bath. Electroplating is the coating of an electrically conductive copper conductor with a layer of metal using electrical current. In a tinning bath, the copper strand is run slowly through a pot of molten tin and as the tin cools it forms a tin plating.

Another problem that early power cables experienced was that the conductor semi-con did not strip cleanly from the conductor making it difficult to splice and terminate. To solve the problem manufacturers again turned to tinning to aid in stripability.

Connectors in splices and terminations were commonly soldered in the early days of power cable. A coating of tin on the conductor strands made them more receptive to solder in comparison to bare copper. Today, the development of compression and mechanical terminations has eliminated the need for soldered connections.

Insulation compound chemistry has come a long way in todays market. The chemistry for cross-linked polyethylene (XLPE) and ethylene propylene rubber (EPR) changed in the 1960s so modern XLPE and EPR insulations use catalysts that chemically cross-link the molecular chains yet do not corrode the conductor. Similarly, advances in semi-conducting shield compounds deliver far better stripability with bare copper conductors.

Corrosion is another reason tinning is considered. Today, there are special electrical contact lubricants such as NO-OX that prevents the formations of oxide films at termination points making tinning less desirable.

In conclusion, unless the power cable installation is in an environment that is continuously exposed to corrosive elements (as is the case in certain wastewater treatment facilities), copper conductor tinning is a practice that is no longer required with today's cable compounds, corrosion lubricants and manufacturing technology. It's an added cost that also requires longer lead times and minimum run quantities. And since it is an environmentally unfriendly process, any reduction in conductor tinning helps to make our environment better.