

Stretch Your Budget by Tossing Tinning

by Marketing Communications
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Historically, tinned copper conductors were a reliability feature. Today, the cost may not be necessary.

If you're specifying power cable installations you want the most hardware you can get for the available dollars. So if you're requiring tinned copper conductors in 600v or medium-voltage (MV) power cable, it may pay to ask why. If there isn't a pretty solid reason, you may find that un-tinned alternatives create some instant slack in your budget.

Tinned conductors with cross-linked insulations have a historical background

"In the 1950s, copper conductors in power cables were frequently electroplated with tin for two reasons: Either to prevent corrosion or to improve strippability," says Sy Shaheen, Southwire Midwest regional sales engineering manager.

At the time, corrosion was an issue because the cross-linking chemistry then in use for cross-linked polyethylene (XLPE) and ethylene propylene rubber (EPR) freed sulfur peroxide as a reaction by-product. The sulfur sometimes interacted with copper conductors to form copper sulfide. Corrosion was especially a problem in 600V power cables, where the insulation is in direct contact with the conductor. Tinning the copper helped to protect it.

In MV cables, the insulation shield gave some protection to the conductors, but the semiconducting shield compounds of the time also introduced strippability issues with bare copper. Tinning the conductors gave better strippability of the shield.

Today, insulation compound chemistry has come a long way. The cross-linking chemistry for XLPE and EPR changed in the 60s, so modern XLPE and EPR don't have the corrosion issues. Similarly, current semiconducting shield compounds deliver far better strippability with bare copper conductors. Still, conservative specification traditions sometimes die hard.

"Some companies still ask for tinned copper conductors with cross-linked insulations, based on old specifications," says Shaheen. "But today the benefits may not warrant the cost."

Some current insulations may still justify tinning

There are still some sulfur-bearing power-cable insulations that may justify the cost of tinning. Some system designers specify that copper conductors be tinned to avoid corrosion from the sulfur in chlorosulfonated polyethylene (CSPE) insulations such as Hypalon®. In MV cables with copper tape shielding and CSPE jackets, tinning the shield protects it against the sulfur in the jacket.

In corrosive environments, protect exposed copper

So tinning can protect conductors from corrosion originating within the cable itself. But in general, the cable insulation system protects copper conductors from corrosion caused by external sources.

Even in more corrosive environments such as waste-water treatment plants, and pulp and paper operations, only a few users still ask for tinned conductors. In these and other harsh environments though, corrosion protection does make economic sense where copper is exposed at cable terminations. The most common method today is to apply an anti-corrosion gel covering to the exposed copper.

"Where sulfur compounds make conductor corrosion a potential problem, tinning may be economically justified," **Shaheen** concludes. "But if you're paying for tinned conductors 'Because we've always done it that way,' you may save some money by reviewing the need for it."

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