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M2Po2E-02 [50]: Direct Measurement of Modified Interconductor Contact Resistance Values in Coated Conductor Stacks and Roebel Cables

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Interconductor contact resistance (ICR) is a key property in determining the stability and current sharing of coated conductor cables. Most coated conductor cables have relatively high contact resistance and low current sharing as fabricated because of surface asperities and the oxide layer that forms on the Cu-stabilizer. Here we work to quantify the induced differences in using three methods to modify ICR: sample "curing", electrodeposition surface modification, and thin conformable inserts. At first a stack of two coated conductors was used to simulate a cable. This stack was put under transverse pressure and exposed to moderate temperatures to promote diffusion bonding via the removal of the unstable Cu-oxide layer (< 200 ℃). Such a method would normally be applied after (e.g. magnet) winding. In a second approach, the samples stack surfaces were modified with a Cr, Ag, Nickel, and Nickel/Teflon nanocomposite layer. In a third approach, a conformable "smart material"was inserted into the stack. ICR measurements were performed on stacks before curing, after curing, for stacks with electrodeposited layers, and for stacks with a smart material insert. In addition, Roebel cables were prepared with electrodeposited coatings on the individual strands, and ICR was compared between the as-received and electrodeposited Roebel cables.

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