

Roebel Assembled Coated Conductor Cables (RACC): Ac-Losses and Current Carrying Potential

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Abstract - Low ac loss HTS cables for transport currents well above 1 kA are required for application in transformers and generators, and are also taken into consideration for future generations of fusion reactor coils. Coated conductors (CC) are suitable candidates for high field application at an operation temperature in the range of 50 to 77 K. Ac field applications require cables with low ac losses and hence twisting of the individual strands. We solved this problem using the Roebel technique. Short lengths of Roebel bar cables were prepared from industrial DyBCO and YBCO-CC. Meander-shaped tapes of 4 or 5 mm width with twist pitches of 123 or 127 mm were cut from the 10 or 12 mm wide CC tapes using a specially designed tool. Eleven or twelve of these strands were assembled to a cable. The electrical and mechanical connection of the tapes was achieved using a silver-powder-filled conductive epoxy resin. Ac losses of a short sample in an external ac field were measured as a function of frequency and field amplitude. Coupling current decay time constants were also measured. We discuss the results in terms of available theories and correlate time constants measured in transverse field with measured coupling losses. Finally, the potential of this cable type for ac use is discussed with respect to ac losses and current carrying capability.

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