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Development of 300 to 500 A/mm² at 10T/4.2K class ReBCO-CORC Round Wires

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Thinner substrate ReBCO tapes, nowadays produced by SuperPower, make it possible to wind thin CORC based ReBCO wires of 3 to 4 mm diameter. The reduction of the tape's substrate thickness from 100 via 50 to 30 micron leads to a significantly reduced minimum bending radius of ReBCO tapes. The 30 micron substrate tapes can now also be manufactured with a width of only 2 mm. Thinner substrates and narrower tapes allow production of CORC wires with more flexibility and a high current density. This technique of thin and round CORC wires opens up their general application in high field magnets and insert coils operating at 4 K as well as magnets operating at elevated temperature in the 20-50 K range, a range uniquely served by ReBCO. CORC wires with various tape layouts were tested in common effort of CERN, ACT and the University of Twente to develop this and potentially break-through technology. The 3.0 to 4.5 mm diameter CORC wire samples are tested in transverse magnetic field of up to 11 T as small solenoids at 4.2 K and in self field at 77 K. The tests demonstrate the ease of use and high performance of the new CORC wires. In addition the tests provide feedback needed to optimize wire manufacturing and joint terminal production.

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