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Mon-Af-Or6-02: Manufacturing and Test of Next Generation 100 kA @ 10 T and 4.5 K ReBCO-CORC Cable-In-Conduit Conductors for Large-Scale Magnets

Monday, 23 September 2019 17:00 (15 minutes)

ReBCO-CORC Cable-In-Conduit Conductors are high-current multi-strand conductors aimed for application in large scale magnets, for example in magnets for particle detectors and fusion experiments; but also for use in bus lines feeding high currents to magnets or other devices. ReBCO based conductors open up the operating temperature range of 20 to 50 K, not accessible by any other practical superconductor, allowing super stability and significant reduction in cooling cost and simplification of the refrigeration plant. ReBCO-CORC also enables a magnetic field in large magnets far beyond 20 T at 4.5 K and a dramatic increase in thermal stability compared to NbTi or Nb₃Sn superconductors.

In recent years, three unique CORC CICC samples with six-around-one cable layout were developed as technology demonstrators at CERN in collaboration with Advanced Conductor Technologies. The tests of these conductors at low temperature in external magnetic field yielded very promising results, but also showed several issues for improvement. A new 2.8 m long CORC CICC has been prepared to further increase the conductor's critical current to 100 kA at 10 T and 4.5 K and to further enhance its thermal, electrical and mechanical stability. The conductor is designed specifically for high-current bus-bars and large detector-type magnets. It therefore features a copper jacket and practical conduction cooling via a cooling line embedded in the jacket. In contrast to previous CICC samples, the voids between CORC strands are now filled with a solder alloy providing mechanical stability to the strands. The new CICC is scheduled for testing at the SULTAN test facility at PSI, Switzerland in Q2 of 2019. Manufacturing details and test results will be reported.

Research on CORC CICC-Conductors is going strong and many new and exciting results are forecast for the years to come.

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