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Tue-Mo-Po2.09-06 [68]: Mechanical and electro-mechanical investigations of assembled HTS CroCo triplets

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High Temperature Superconductor CrossConductor (HTS CroCo) is manufactured by soldering REBCO tapes of two different widths in a cross-shape form. In a new long length fabrication process, the HTS CroCos are already embedded in solder to obtain a round outer shape. This allows to add an outer copper tube around such an HTS CroCo for increased mechanical and electrical stability. The mechanical and electro-mechanical properties of HTS CroCos fabricated from REBCO tapes of different widths, with and without additional copper encapsulation is investigated and compared.

In a high-current cable-in-conduit conductor (CICC), several HTS CroCos can be cabled to achieve the required current. The smallest multi-strand conductor is a triplet of such HTS CroCos. Based on the performance of the individual HTS CroCos under bending and transversal loading conditions, an HTS CroCo triplet CICC will be designed for operation at high-currents (>10 kA) and high magnetic fields (>10 T). Operating the triplet under such conditions will inevitably lead to high Lorentz forces acting on the strands of the triplet-CICC.

In order to investigate the electromechanical performance of cabled HTS CroCo triplet samples prior to their use in a large high-field demonstrator, short triplet samples will be loaded with transversal mechanical pressure in a universal testing machine at 77 Kelvin, self-field, to simulate the Lorentz forces of the intended high-current, high-field application. The maximum allowable transversal load will be investigated for different triplet sample arrangements in order to determine design limits for the triplet winding demonstrator.

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