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## Fri-Mo-Po.01-11: Design and construction of a small-scale layer-wound no-insulation (LW-NI) insert magnet with REBCO coated conductors operating in a background magnetic field exceeding 15 T

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Rare-earth-based barium copper oxide (REBCO) coated conductors have shown remarkable high in-field performance in current transport and tensile strength, and their application as a layer-wound insert magnet during the construction of a high-field superconducting magnet is reasonably expected. However, the inhomogeneous stress distribution induced by the screening current, coupled with significant vertical magnetic field exposure at the end of the magnet, poses threats to the mechanical stability of the layer-wound insert magnet. Meanwhile, the quench protection in REBCO magnets is a critical issue, adopting no-insulation winding can provide the super magnet with self-protecting capability. To verify the feasibility of the manufacturing process for the layer-wound magnet as well as accumulate technological reserves for the subsequent construction of nuclear magnetic resonance (NMR) magnets, a layer-wound no insulation (LW-NI) insert magnet was fabricated with REBCO-coated conductors. The winding has an inner diameter of 40 mm, an outer diameter of 42 mm, and a total height of 66 mm, nine layers of REBCO tapes were wound with 18 turns per layer. The layer-wound magnet successfully operated with the current of 480 A (1  $\mu\text{V}/\text{cm}$  criterion) and generated 1.13 T self-field in the axial direction of the magnet in an external 14 T background magnetic field (15.13 T in total) at 4.2K.

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