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Wed-Af-Po3.24-02 [96]: Design, Construction and Test of a Double-Pancake Coil wound with Kilometer Long REBCO tape

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Motivated by our previous works, 26.4-T 35-mm and 18-T 74-mm ultra-high field no-insulation (NI) stand-alone magnets wound with 2G REBCO, we recently embarked on a new project to develop a 35-T NI REBCO standalone magnet. We published a design of a 35-T 40-mm winding bore magnet in 2017. Owing to the large average current density of the magnet (365 A/mm²), the magnet became highly compact; the winding outer diameter was 222 mm, while the overall winding height was 628 mm. It consisted of a stack of 52 double pancake (DP) coils and each 1500-turn DP coil requires ~600 m long REBCO tapes. As a part of the project, we fabricated and tested a single DP coil wound with a kilometer long REBCO tape to investigate manufacturing details. In this paper, we present design and construction details of the test coil, and test results in a bath of liquid nitrogen at 77 K and in conduction-cooling at 20 K.

Keywords: NI winding, REBCO tape, superconducting magnet, ultra-high field

Category: G09 - Small Test and Model Coils

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