

## Ultra-small Diameter Round REBCO Wire with Robust Mechanical Properties

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**Abstract** — The critical current ( $I_c$ ) of REBCO tapes with different hastelloy-substrate and copper-stabilizer thicknesses has been investigated under high compressive bend strain to achieve a high  $I_c$  retention when wound on ultra-small diameter formers. A single layer round wire made winding the most robust REBCO tape on a 0.81 mm copper former has been tested for its critical current at several twist pitches under combined torsion and compressive strain. Finally, the critical current of a multilayer round wire of 1.6 mm overall diameter has been tested at different bend diameters. These studies confirm the superior retention of critical current under combined effect of high torsion and compressive bend strain of our ultra-small diameter REBCO wires compared to wires/cables made with typical commercial REBCO tapes in the past.

**Keywords (Index Terms)**— Critical current, REBCO, stabilizer, ultra-small diameter, round wire, flexible, compressive, bending strain.

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