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Reversible Ic degradation behavior in REBCO coated conductor tapes with different configuration under transverse stress

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Second generation (2G) coated conductor (CC tapes) with rare-earth barium copper oxide (REBCO) gained its popularity in electrical field applications such as motor and generators, power cables, and especially coils. This is due to its superiority in characteristics and performance compared to the first generation (1G) CC tapes. However, in coil applications, the CC tapes might experience several factors that might limit its optimum performance or worst, possibly damage its integrity through the delamination of its layers. Such factors include excessive transverse stresses produced by large Lorentz force, coefficient of thermal expansion (CTE) mismatch of each constituent layers, screening current and other fabrication related reasons. As reported elsewhere, the critical current, Ic of impregnated coil was completely degraded due to the delamination of the CC tape's layer. Therefore, in coil designs, mechanical and electromechanical delamination strength of the CC tape should be enough to withstand these threatening factors for the optimum design. In this study, mechanical and electromechanical properties of CC tapes with high critical current were investigated under transverse load using the popular anvil test. Especially, reversible critical current degradation behaviors under transverse stress were examined. Damination mechanism of the CC tape under transverse loading was thoroughly investigated. Lastly, the effects of brass and copper lamination regarding their thickness and properties on the reversible Ic behavior and the delamination mechanism were investigated. This work was supported by a Grant from the Power Generation & Electricity Delivery Program of the Korea Institute of Energy Technology Evaluation and Planning (KETEP) funded by the Ministry of Trade, Industry and Energy, Republic of Korea.

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