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Performance Evaluation of Practical REBCO CC Tapes for Superconducting Coils for Wind Power Application

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A Korea-type 10 MW-class large scale superconducting power generator with floating offshore wind power system which incorporates high-temperature superconducting (HTS) 2G coated conductor tapes for race-track coils are developing. Their operation conditions will be in a temperature range from 20 to 40 K and under a magnetic field of 2 T. Therefore, it is needed to investigate mechanical and electromechanical properties of commercially available practical REBCO CC tapes under the superconducting wind power application conditions. In this study, the electromechanical performance of differently processed REBCO CC tapes was evaluated at both test conditions of 77 K/self-field and 35 K/2 T using 4 mm wide and 12 mm wide REBCO CC tapes, respectively. In addition, in the aspect of reliability assessment, the I_c degradation behaviors of 12-mm wide IBAD/RCE-DR Cu-stabilized GdBCO CC tapes using high-cycle fatigue test were investigated at 77K and at a stress ratio, $R = 0.1$. The correlation between the mechanical and electromechanical performances of practical REBCO CC tapes under specified test conditions were examined.

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