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Tue-Mo-Po2.10-10 [82]: Electromechanical Performance of Practical REBCO CC tapes for Superconducting Wind Power Applications

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A project to develop a Korean-type large scale floating off shore wind power system with a superconducting wind power generator has started. It is an innovative wind power project on the development of high-temperature superconducting (HTS) magnet, test facility, offshore floating system, and network connection technologies for the design of 10 MW class floating offshore wind power system with superconducting generator fully supported by KEPCO (Korea Electric Power Corporation). To make large-scale application of REBCO coated conductor CC tapes possible especially in superconducting wind turbine generator, it is required to pursue a high generation efficiency, low weight design utilizing a higher performance of REBCO CC tapes at cryogenic temperatures and under magnetic fields. For the performance evaluation of the CC tapes, it is important to investigate the stress and strain dependency of I_c in both reversible and irreversible degradation region under external magnetic field. Generally, under magnetic field, the I_c degradation behavior may be different from the results obtained at self-field and dependent on the fabrication processes and materials of adopted practical CC tapes. In this study, the electromechanical properties including I_c degradation behavior and the irreversible limits of commercially available REBCO CC tapes were examined by the uniaxial tension tests at the expected operating condition of 77 K, 0.5 T and 30 K, 2 T. The obtained irreversible limits were compared to the ones at 77 K and self-field. Three kinds of CC samples were adopted, namely; the RCE-DR Sn-Cu stabilized, IBAD-PLD (ISD) Cu stabilized, and IBAD-PLD Cu stabilized CC tapes.

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