# Mechanical and electromechanical properties of IBAD-MOCVD-based REBCO coated conductors

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Mechanical characteristics and electromechanical properties of the IBAD-MOCVD-based REBCO coated conductor wires were experimentally studied by using various testing methods including longitudinal tensile test, bending test, transverse tensile test, and peel test for the purpose to understand the basic mechanical behaviors and to determine the stress (strain) limits of Ic retention of the 2G HTS wires. The Ic responses to the longitudinal stress (strain) levels were measured at 77K with a focus on the effect of the substrate/stabilizer thickness ratio. Tensile strain limit of the REBCO film was investigated by testing partially processed coated conductors before the deposition of the stabilizers. Bending test was carried out on composite conductors produced by a bonding process and on splices fabricated by a soldering process to determine the minimum bending diameters and for comparison with the wires in the original architecture. Weibull statistical analysis was performed on the data obtained from the transverse tensile tests, namely the pin-pull test and the anvil test, to evaluate the delamination strength. For both the transverse tensile tests, a good fit of the experimental data to the Weibull distribution was observed. Based on the Weibull analysis it is suggested that a critical stress at which the failure probability is 0.01 can be used to define the transverse tensile strength. Delamination of the coated conductors was also investigated using a peel test where the delamination strength is characterized by well-defined peel strength that is determined from the peeling load versus displacement curve. Featuring a steady-state process the peel test is an effective method for the study of the delamination phenomenon in the coated conductors.