

Onset of mechanical degradation due to transverse compressive stress in Nb₃Sn Rutherford cables as a function of heat treatment and impregnation.

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This work presents observations on crack formation in Nb₃Sn Rutherford cables that underwent a variation in the heat treatment cycle and the resin used for impregnation. The main purpose of the study is to compare the crack initiation limits and propose a combination of parameters to improve the mechanical strength of the cables. While lowering the final dwell time of the heat treatment cycle has shown to improve the damage onset limit, there is a trade-off in the electrical performance. In this context, impact on critical current, residual resistivity ratio of the strands are also presented. Results from microstructure analysis performed on cable samples subject to the transverse compression, with a variation in the heat treatment cycle and impregnation resin, are compared. Following this, differences in the damage onset and evolution are also explored.

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