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Status of AC loss verification tests on ITER conductors with transverse load cycling

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Each strand-cable-jacket combination of ITER magnet conductor will undergo a characterization in which the AC losses are evaluated as a function of mechanical load cycling, to simulate the expected Lorentz loading during the lifetime of the magnet. A first series of ITER conductor tests with the press have commenced on Cable In Conduit Conductors (CICCs) manufactured at different ITER Domestic Agencies.
Here we present the results obtained so far of the coupling loss and the cables mechanical stiffness measurements of the full-size ITER CICCs from different manufacturers. The mechanical properties and coupling losses were measured as a function of transverse cyclic loading to simulate the effect of expected Lorentz loading during operating condition of the magnet. The maximum force applied to the conductors was limited to the expected peak loading condition for the ITER conductor. The number of cycles used in the measurements is up to 30,000. The cable compression was measured by a set of displacement meters mounted on the cable. From the compression value with respect to the applied load, we evaluate the cable transverse mechanical stiffness. The evolution of the stiffness and mechanical losses due to cable compaction as a function of cycles is presented. The cable coupling loss is measured in a magnetic modulation field of 150 mT with an offset field 350 mT for a fully loaded and in a fully unloaded state. The coupling loss is largely determined by the changing of contact resistance between strands that form various current loops of dominant time constants. The results for different conductors tested so far are presented and compared.

Disclaimer: The views and opinions expressed herein do not necessarily reflect those of the ITER Organization.

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