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ITR/2-5: Test Results of ITER Conductors in the SULTAN Facility

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Starting March 2007, over 60 ITER cable-in-conduit conductors (CICC) have been tested in the SULTAN test facility in Villigen, Switzerland, including TF, CS, PF and busbars samples. The conductors are supplied by the ITER Domestic Agencies (DAs) and assembled into SULTAN samples at CRPP. The test reproduces the actual operating conditions in the ITER coils, except for the hoop load and the CS maximum field. Depending on the stage of the procurement, the SULTAN samples are categorized into Design Verification, Supplier Qualification, Process Qualification and Series Production. The number of remaining samples to be tested during the ITER construction phase is about 40.
For the NbTi CICC, the results confirm the prediction from the strand data, which are made taking the peak field over the conductor cross section as operating field. At low current density, where the n-index of the transition is measurable, the NbTi CICC and the NbTi strand have the same n-index. All the NbTi samples passed the supplier qualification phase.
For the Nb3Sn CICC, the performance prediction is hindered by the irreversible degradation caused by filament damage occurring during cyclic loading. At the first run of the test campaign, the performance of all the Nb3Sn samples largely meets the target. Contrary to the NbTi CICC case, the n-index of the transition is substantially lower than in the strands. The performance loss upon load cycles and thermal cycles has a broad range. All the TF conductor samples passed the supplier qualification phase. For the CS conductors, the supplier qualification phase will be finalized in 2012.

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