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Inter-layer Joint for the TF Coils of DEMO - Design and R&D

Wednesday 30 August 2017 13:15 (1h 45m)

In summer 2015 a new reference baseline is issued for the DEMO EUROfusion tokamak. Thereafter, the toroidal field (TF) coils have been updated with the new layout of the react-and-wind conductor proposed by the Swiss Plasma Center (SPC). Each TF coil consists of 12 single layers of graded Nb3Sn conductors connected in series by "invisible"inter-layer joints fully embedded in the winding pack. The high-grade Nb3Sn conductor operates at 63 kA, 12.4 T with Tcs above 6.5 K. The new prototype of the high-grade cable has been manufactured and delivered to SPC: 20 meters of Nb3Sn and about 10 meters of copper dummy conductor. The copper dummy conductor, which is structurally identical to the Nb3Sn conductor, was used for assembly trials of dummy inter-layer TF coil joint in order to develop the technological process. To prepare the joint, the sub-cables of the heat treated conductors are cut at staggered positions and matched to restore the geometry of the cable, without protrusion. The joint assembly is soft soldered to reduce the contact resistance and encased in the conduit shells. A SULTAN sample including a TF coil Nb3Sn inter-layer joint is being completed at SPC, the test of this joint is expected in October 2017.

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