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Full-Scale Trial Results to Qualify Optimized Manufacturing Plan for ITER Toroidal Field Coil Winding Pack in Japan

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A heat-treated Nb₃Sn cable-in-conduit conductor (CICC) must be inserted into a groove of a radial plate (RP), which is designed to maintain the mechanical and electrical reliability of the insulation of ITER Toroidal Field (TF) coil during its 20 years' operation. The difference between heat-treated conductor length and RP groove length must be controlled with accuracy of +/-0.05%. JAEA developed high accuracy winding system and procedure with the order of +/-0.01% in wound conductor length and performed full-scale winding trials. The target tolerance of +/-0.01% was achieved. In addition, very complicate procedure of RP insertion between upper and lower windings (pancakes), which consist of unit length conductor, is also qualified by using full-scale dummy conductor winding and trial insertion of wound dummy conductor into RP groove was performed, too. Furthermore, proto double-pancake (DP) was successfully heat-treated. These results justify validity of optimized manufacturing plan and allow us to start TF coil winding pack (WP) manufacture.

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