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P3.080 Development of Insulation Technology with Vacuum-pressure-impregnation (VPI) for ITER PF6 Double Pancakes

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The Poloidal Field(PF) coils are one of the main sub-system of ITER magnets. The PF6 coil is being manufactured by the Institute of Plasma Physics, Chinese Academy of Sciences(ASIPP) as per the Poloidal Field coils cooperation agreement between ASIPP and Fusion for Energy(F4E).

The PF6 coil winding is constructed from nine double pancakes (DPs) which are plane cylindrical solenoids of about $\varnothing 10.2\text{m} \times 0.12\text{m}$ in size and about 29 ton in weight. The turn and pancake insulation of DPs are electrically insulated with a glass tape/polyimide interleaved multilayer composite, which should be impregnated with epoxy resin. Series DPs are being insulated in ASIPP with the vacuum-pressure-impregnation (VPI) technology, which is an effective process to remove defects such as dry spots and over rich resins in the insulation system. In this paper, the authors introduce the detailed VPI process including the insulation materials and insulation structure for PF6 DPs and present the results of the related geometry and electrical tests performed. The geometry parameters are assessed with profile tolerance, flatness as well as the parallelism by a laser tracker. meanwhile, the high voltage (HV) tests of the DPs insulation, including the direct current (DC) and alternating current (AC) tests are examined. The results of the tests are discussed versus the design requirements.

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