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Completion and Installation of the ITER Lower Poloidal Field Coils PF5 & 6

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The poloidal magnetic field of ITER is provided by 6 Niobium–Titanium (NbTi) coils mainly for plasma shaping and position control. The fabrication of the two lower coils PF6 from China ASIPP and PF5 from European F4E has been completed and the coils installed in the bottom of the Tokamak pit in 2021. This paper presents the challenge of the manufacturing process, which involves manufacturing of several dozens of superconducting double pancakes, requiring bending, insulating and welding steps to keep accuracy of a few mm on dimensions up to 25m. The reproducibility and reliability of the manufacturing processes to manage magnet winding/insulation and cryogenic skills are essential for final quality and schedule robustness.

After having successfully completed final thermal cycles for site acceptance in Cadarache, the PF6 and PF5 have been delivered simultaneously and handed over to IO. This paper demonstrates the assembly scenario of the two coils, including assembly tools for transportation, preparation for lifting, lifting tooling design, temporary supports design in cryostat and alignment of positioning on supports from assembly hall to the tokamak pit. The coils are sensitive components and preservation steps are needed to protect them in the pit during other assembly operations.

In future, the two coils will sit in pit for several years until mounted onto the TF coils through the support then connected to feeders at the coil terminals. PF6, PF5 will firstly rest on temporary supports, and later shift up by jacks and conical guides to align onto TFC. The alignment & shimming processes and tightening will be presented to show the practical functionality and avoidance of interferences with the other components of the ITER tokamak which achieving high accuracy to avoid error fields.

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

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