

Manufacture of the Poloidal Field Conductor Insert Coil (PFCI) (P1-E-516)

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Within the framework of the R&D programme for ITER (International Thermonuclear Experimental Reactor) the European team EFDA (European Fusion Development Agreement) have been charged with the design and manufacture of the Poloidal Field Conductor Insert Coil (PFCI). The purpose of the PFCI is to test and demonstrate the performance of long length full scale NbTi conductors in ITER relevant conditions. The PFCI will be tested in the Central Solenoid Model Coil test facility at the JAEA Naka Japan. This paper details the complete manufacturing details of the PFCI including development, forming machining, pre-assembly, impregnation, final assembly and testing. The PFCI is a single layer wound solenoid of 9 turns with a transition joggle in the centre section of the winding and an intermediate joint connection between the upper termination and the main coil winding. To give the required overall dimensions to fit in the testing facility, pre-formed and machined glass resin composite filler pieces are assembled with the winding and finally Vacuum Pressure Impregnated to create a single assembly unit. The PFCI is enclosed for assembly in a support structure which consist of an upper and lower flange that each are made up by 4 machined stainless steel castings which are electrically insulated by epoxy glass sheet material and 12 tie rods which preload the complete assembly in the vertical direction while the upper flange is equipped with 4 radial restraining jacks and the lower flange is equipped with 4 sets of studs and shear keys to withstand the net vertical and lateral electromagnetic forces. The PFCI is equipped with inductive heaters, voltage taps, temperature transducers, strain gauges and other instrumentation as diagnostics to monitor the performance. The current status of the manufacture is that the coil is in the process of final impregnation and should be completed and delivered before the summer of this year.