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Design of a PF1 coil helium inlet and dummy joint samples for fatigue tests at 77 K

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Helium inlet (HI) and electrical joint (EJ) between conductors are critical elements of double pancakes (DP) of ITER PF-1 coil.
HI is a part of the PF-1 coil used to inject the liquid helium into PF1 conductor channel.
The full-scale sample of HI and mechanical loading facility have been designed and manufactured to perform a fatigue tests at 77K under required strain and to check leak tightness of the HI sample. Thermocycling (296-77K) and leak tightness test of HI were carried out before and after fatigue tests.
The low ohm EJ is used to connect two lengths of NbTI CICC into a single electric circuit,
To qualify the technique and equipment for EJ manufacturing the dummy joint (DJ) qualification sample has been designed to simulate required strain of fatigue test. The main feature of the sample design is the symmetric combination of two DJs to compensate the bending moment.
The HI sample passed fatigue test successfully in 2013 year. Fatigue tests of DJ sample will be carried out in 2014.
The article includes the results of the HI and DJ design stress analyses under required test conditions, the facility description for fatigue tests at 77K, HI sample fatigue and leak tightness tests results.

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