

TITLE

Manufacturing pre-qualification of a Short Breeder Unit mockup (SHOBU) as part of the roadmap towards the out-of-pile validation of a full scale Helium Cooled Pebble Bed Breeder Unit

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PAPER

The key components of the Helium Cooled Pebble Bed Test Blanket Module (HCPB TBM) in ITER are the Breeder Units (BU). These are the responsible for the tritium breeding and part of the heat extraction in the HCPB TBM. After a detailed design and engineering phase performed during the last years in the Karlsruhe Institute of Technology (KIT), a reference model for the manufacturing of a HCPB BU mock-up has been obtained. The mid-term goal is the out-of-pile qualification of the thermal and thermo-mechanical performance of a full-scale HCPB BU mock-up in a dedicated helium loop.

Several key manufacturing technologies have been developed for the fabrication of some parts of the BU. In order to pre-qualify these techniques, a SHORt Breeder Unit mock-up (SHOBU) has been constructed and tested. This paper aims at describing the constitutive parts of SHOBU, the manufacturing technologies involved, the assembly sequence (taking into consideration functional required steps like its filling with Li₄SiO₄ pebbles or its assembly in the HCPB TBM) and the welding procedures executed. The paper concludes with a description of the required pre-qualification tests performed to SHOBU, i.e. pressure and leak tightness tests, according to the standards and with a final exposition of the relevance of SHOBU with a full-scale HCPB BU.