Design of Coolant Purification System for the European Test Blanket Modules

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The HCPB (Helium Cooled Pebble Bed) and HCLL (Helium Cooled Lithium Lead) Test Blanket Modules (TBMs), developed in EU to be tested in ITER, adopt helium at 8 MPa as primary coolant.
This paper presents a detailed design of the TBMs coolant purification system (CPS) based on the need to remove permeated tritium and gas impurities.
The following steps have been considered: identification of CPS design requirements; selection of the most promising technologies for CPS; design of the components, indications on instrumentation and procedures for tritium balance.
The proposed solution is a three stage process constituted by an oxidiser to convert Q_2 and CO to Q_2O and CO_2, an adsorption step, performed on molecular sieve at room temperature to remove Q_2O and CO_2, and a final step performed on a heated getter to remove residual impurities.