

PROGRESS OF HE-COOLED DIVERTOR DEVELOPMENT FOR DEMO

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A He-cooled divertor concept for DEMO [1] has been pursued at Karlsruhe Institute of Technology (KIT) with the goal of reaching a heat flux of 10 MW/m². The reference concept HEMJ (**He**-cooled **m**odular divertor with multiple-**j**et cooling) is based on the use of small cooling fingers, each composed of a tungsten tile brazed to a thimble made of W-1%La₂O₃ tungsten alloy. The cooling fingers are connected to the main structure of ODS Eurofer steel by brazing in combination with a mechanical interlock. Divertor cooling is performed by helium jet impingement at 10 MPa, 600°C. This paper reports progress to date of the design accompanying R&Ds, i.e. primarily the fabrication technology and HHF experiments. For the latter a combined helium loop & electron beam facility (200 kW, 40 keV) at Efremov Institute, St. Petersburg, Russia, has been used. This facility enables mock-up testing at a nominal helium inlet temperature of 600°C, a pressure of 10 MPa, and a maximal pressure head of 0.5 MPa. HHF test results till now confirm well the divertor design performance. In a recent lifetime test a mock-up withstood 1,000 load cycles without damage.

[1] P. Norajitra, et al., Current status of He-cooled divertor development for DEMO, Fusion Eng. Design 84 (2009) 1429–1433.