Fabrication and Testing of the EU FW Qualification Mock-up

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ITER requires the Domestic Agencies (DA's) to be pre-qualified prior to participate in the supply of critical components, among which the Blanket First Wall (FW). Phase 1 of the qualification campaign for the ITER FW consisted of the fabrication and testing of 2 small-scale mock-ups (SSMU) - 80 x 240 mm - to demonstrate the ability of the selected fabrication technology to resist to the expected thermal loads. This paper first describes the activities performed in Europe to manufacture the EU FW SSMU. In particular, the EU-DA has manufactured and tested 2 SSMU's produced by Hot Isostatic pressing (HIP) to bond both stainless steel to CuCrZr and then CuCrZr to Be. Manufacturing has taken place at CEA, in Grenoble. Then, this paper reports on the SSMU successfully passing the required 12000 cycles at both 0,88 and 0,625 MW/m^2 fatigue tests and the 1000 cycles of the MARFE tests at 1,75 MW/m^2, and additional tests up to 2.75 MW/m^2, fully validating HIP as a robust bonding technology for the considered FW materials. The testing campaign took place at 3 locations: the Nuclear Research Institute (NRI Rez, plc) in the Czech Republic, the Forschungszentrum Juelich (FzJ) in Germany and Sandia N.L. in the USA.

Figure 1: EU qualification mock-up after high heat flux testing.