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VACUUM TESTS OF THE ITER FIRST WALL PANEL PROTOTYPE *)

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ITER First Wall panel prototype is a multilayer structure with water cooling channels and consists of a massive stainless steel base on which plasma-facing units (PFUs) are installed. Each PFU consists of a stainless steel body, to which a bimetallic bronze-steel lid is welded by laser welding, the bronze surface of the lid is covered with a protective lining. The heat from the (FW) is removed using water circulating through cooling channels with a flow rate of 9.125 kg • s-1 and a pressure of 4 MPa, with an outlet temperature of 110 ℃ from the FW.

Vacuum tests of ITER components are carried out during the production process to confirm the reliability of these components, their components and production processes, as well as to reduce the risk of leaks in the system, which are subsequently difficult to detect or eliminate [1].

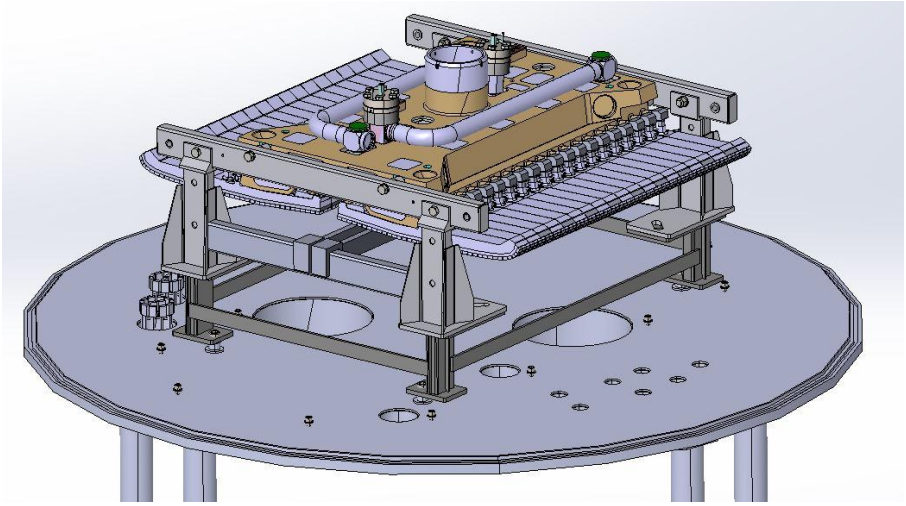

Fig.1 – The First Wall panel prototype on the vacuum chamber table

The paper presents the results of testing the the First Wall panel prototype by the vacuum chamber method. The test object was placed in the volume of the vacuum chamber, which was then pumped out to achieve a pressure of no more than $1 \cdot 10^{-3}$ Pa, helium was injected into the cooling channels to an operating pressure of 4 MPa for at least double the response time of the leak detector, but for at least 15 minutes. The vacuum tests consisted of 5 pressure raising cycles at room temperature (<80°C) and 3 cycles at 250 °C. During the tests, the background level of helium in the vacuum chamber should not exceed $7 \cdot 10^{-11}$ $Pa \cdot m^3 \cdot s^{-1}$ in air equivalent; and the maximum allowable helium flow for cold and hot tests in air equivalent is $1 \cdot 10^{-10}$ $Pa \cdot m^3 \cdot s^{-1}$ и $5 \cdot 10^{-10}$ $Pa \cdot m^3 \cdot s^{-1}$ respectively.

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References

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*) abstracts of this report in Russian