Problems of the vacuum testing of in-chamber components of the ITER reactor

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The report provides an overview of the problems encountered during vacuum testing of in-chamber components of the ITER reactor. Basically, these problems are related to the increased requirements of the international organization (IO) ITER to conduct vacuum tests of in-chamber components of the reactor. The review is based on the model of the Divertor DOME, as the typical representative of in-chamber components of the ITER reactor.

The results of research aimed at finding solutions to meet the requirements of IO ITER for vacuum test are presented. The main difficulty lies in reaching background level in the vacuum chamber which allow to provide the required sensitivity when heating DOME to 250 oC. Tests with elevated temperature are necessary sine such temperature will affect all in-chamber components of the reactor during service operation of the reactor (for example during baking). Two methods of background level reducing were investigated: with nitrogen trap and with gas absorber based on Ti–Zr–Al alloy. The results of these studies made it possible to determine the nature of the background in the vacuum chamber and to draw conclusions about the technical features of vacuum tests of ITER in-chamber components.