GAS EMISSION OF ITER EQUATORIAL PORT 11 AND BORON CARBIDE TESTS FOR PROTECTION OF DIAGNOSTIC PORTS [[1]](#footnote-1)\*)

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One of the main tasks for the diagnostic ports of the ITER is the neutron protection of diagnostic equipment, especially those located in the vacuum part of the plant, right next to the reactor "hot" zone. For neutron protection of the ITER port-plugs developed by the Budker Institute, the use of boron carbide ceramics has been proposed as it is lightweight, which is critical for port-plugs, and boron has a high neutron capture cross-section. However, during the conceptual design of the ITER vacuum chamber it was not intended to use B4C ceramics, while at the final design stage of the equatorial port-plug (EPP) #11 it is planned to use a large number of ceramics. Detailed calculations of the area of all vacuum-facing components, both steel and ceramic, have been performed for EPP#11.

To confirm the possibility of using large quantities of ceramics in the ITER vacuum chamber, long and reliable vacuum tests with large quantities of ceramics from Russian manufacturers were carried out. Vacuum tests and preparation for them were carried out according to ITER Vacuum Handbook requirements.

As a result of the research, the possibility of using the boron carbide-based neutron protection of the ITER thermonuclear reactor from Russian ceramics inside the vacuum chamber has been proved. It is shown that after several months in vacuum the outgassing rate of ceramics decreases by 3 times.

Together with the Russian ITER Agency and the ITER Organization, a specification for boron carbide ceramics has been developed, on the basis of which it is possible to purchase ceramics for use in ITER ports.

Experiments on activation of samples of boron carbide and 316L-ITER Grade stainless steel ceramics by fast neutrons were carried out, which showed a rapid reduction of residual radioactivity in samples and absence of hazardous impurities.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/E/ru/HC-Shoshin.docx) [↑](#footnote-ref-1)