PROPERTIES OF A SUPPLY BATCH OF BORON CARBIDE CERAMICS FOR THE PROTECTION OF ITER DIAGNOSTIC PORTS [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2022.49.1.165

1,2Shoshin A., 1,3Burdakov A., 1Ivantsivsky M., 1,2Polosatkin S., 1,2Sulyaev Yu., 1,3Semenov A., 4Ovsienko A.

1Budker Institute of Nuclear Physics, Novosibirsk, Russia
2Novosibirsk State University, Novosibirsk, Russia,
3Novosibirsk State Technical University, Novosibirsk, Russia,
4Virial LTD., St.Petersburg, Russia

Boron carbide ceramics will be used for the neutron shielding of the diagnostic ports of the ITER experimental international fusion reactor (under construction in France). Production of the ceramics must comply with the ITER Organization's approved ceramic manufacturing specification ITER\_D\_457TBH and drawings ITER\_D\_X2GWTZ. This specification has requirements both to the properties of ceramics and to the conditions of its production. The finished ceramics must consist of at least 97% by weight of boron carbide. There are requirements for density, thermal (heat capacity, thermal conductivity, coefficient of linear expansion) and vacuum properties (outgassing rate into vacuum). The requirements to the outgassing rate are very strict and exceed the requirements to other materials in the ITER vacuum chamber by 10 times. Ceramics must have outgassing rate below 10-8 Pa\*m3/s/m2 for hydrogen at 100 ºС.

Virial LTD manufactured the first batch of sintered carbide ceramics, which will be installed in shielding trays at the BINP SB RAS and then the cassettes will be installed in the ITER Equatorial Port #11. The ceramics have been cleaned as required by the ITER Vacuum Handbook (ITER\_D\_2EZ9UM) and packaged in individual vacuum bags to maintain purity. The packaging method was agreed with the ITER Vacuum Section.

The report presents the results of measurements of mechanical, thermal, and vacuum properties of the first supply batch of sintered boron carbide ceramics to be installed in the ITER vacuum chamber. Vacuum tests and their preparation were carried out according to the requirements of the ITER Vacuum Handbook.

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