Preliminary design of UP #02 and UP #08 INTEGRATION

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ITER diagnostic ports are designed to hold and to protect the tokamak equipment. These systems will be operated in extremely unfavorable conditions due to neutron, hydraulic, thermal, vibration, shock, electromagnetic and other kinds of loading.

The purpose of this work is developing the structures for the diagnostic and other equipment in the upper ports # 02 and # 08 of ITER. For the last period, a new stage of preliminary design of port elements for placing the equipment in these ports, was performed. During this stage, three-dimensional models of port-plugs were improved, including a diagnostic first wall (DFW), diagnostic shielding module (DSM), port-plug structure (PPS). Ex-vessel support structures have been upgraded to accommodate the equipment in the interspace and in the port-cell regions.

The last stage of neutron calculations has demonstrated the effectiveness of the in-port shield located behind the DSM. Numerical simulations of thermal, thermo-hydraulic, electromagnetic and mechanical loads on the designed elements of diagnostic ports prove the efficiency of the current design version.

Idea to use the in-port neutron shielding of the port-plug (developed by the BINP SB RAS), as well as the idea of filling the support structures in the interspace with shielding elements, were approved by ITER Organization (France).

In preparation for Defense of preliminary projects of the upper ports # 02 and # 08, the sets of project documentation were arranged, in particular the system loads specifications were written on the basis of the results of thermal, thermo-hydraulic, electromagnetic and mechanical calculations.

The principal design solutions and the results obtained in the frame of this work can be used in the development of other upper port-plugs in ITER, as well as in the applications for devices with similar parameters of operation.