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## DEVELOPMENT OF TECHNOLOGICAL EQUIPMENT FOR INSTALLATION/EXTRACTION OF VNC DIAGNOSTIC BY REMOTE HANDLING OPERTIONS<sup>\*)</sup>

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The Vertical Neutron Camera (VNC) for the ITER will consist of two parts (upper and lower), each of them will contain six detector units combined into hermetic diagnostic modules equipped with a service vacuum system and water cooling system. The upper VNC will be installed in the upper port (UP) №18 and should be part of the DSM of this port, the lower VNC will be installed in the lower port (LP) №14.

The vertical neutron chamber is a multichannel neutron collimator intended to characterize fusion plasma neutron source. VNC measures the time resolved neutron emission profile for both DD and DT ITER plasmas, providing the evaluation of the fusion power density, neutron and  $\alpha$ -source emissivity profile, ion temperature profile, fusion power and total neutron flux and others parameters.

This report presents the procedures and operations required to install, remove or replace a faulty diagnostic cassette with a new one using a remote handling system. This system is a robotic mechanism and tools that make it possible to perform various operations with activated diagnostic elements, excluding possible human contact with these elements.

These procedures involve several main components: VNC cassettes, water cooling system pipes, service vacuum system pipes, electrical connectors and support structures. Two structures were developed - a guide and a lifting one. The guide structure has a special shape that ensures the correct trajectory of lowering the cassette, does not allow physical contact or impact with the diagnostic shielding module (DSM) of the upper port #18, it is mounted on the standard mounting locations of the diagnostic first wall and has cutouts in the side walls to ensure the possibility of performing operations with the lifting structure and visual observation. The lifting structure is attached to each of the cassettes on top, with its help the cassettes are lowered into the DSM. The main purpose of this structure is to protect the electrical connector from possible impact with the mating part of the connector and to ensure a smooth and reliable connection of the connector with the mating part.

Before removing the cassettes from the DSM, it is necessary to cut the pipes of the water cooling system and the service vacuum system in special places where access is provided for the remote handling tools. After the cassettes are correctly installed in the DSM, it is necessary to weld these pipes. After the cassettes are installed in their correct location, all mounting bolts are tightened, the connector is connected and the pipes are welded - the VNC is considered installed.

<sup>\*)</sup> abstracts of this report in Russian