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DEMOUNTABLE CONNECTION OF THE ITER FIRST WALL ^{*)}

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The demountable connection of the first wall full-scale prototype (FW FSP) is a connection of the outlet pipes of the cooling channels of the FW with the equipment and the pipeline of the helium supply system with pressure of a vacuum test facility. The tightness of the connection is ensured by a system of sealing rings, which allows to achieve high vacuum values.

The purpose of the work is to study the demountable connection between the nozzle of the helium supply system and the input hydraulic connectors of the FW FSP during the cycle of vacuum tests with helium for tightness at various temperatures. Welding is traditionally used for this type of connections, which requires subsequent machining. Because due to the specifics of the design of the hydraulic connector, it is impossible to carry out a traditional return, we proposed using a demountable connection, where the most significant risk is the appearance of unacceptable leakage through the seals used. Non-tightness will lead to a deterioration in the sensitivity of the leak detector during testing, as well as summing up with leakage through the test object, will lead to a false rejection of the latter. Therefore, in case of poor-quality sealing, there is a need for repeated tests. In this case, the risk reduction strategy is to use the most reliable sealing system that will ensure an acceptable level of leakage. The experimental substantiation of the developed design of the prototype of the detachable connection is carried out on models representing an exact copy of the hydraulic connectors of the FW FSP.

Metal seals from two manufacturers were selected to conduct final tests of the demountable connection: HTMS (Belgium) and Technetics (France-USA). Both types of seals are a metal spring enclosed in a toroidal metal body with a soft, easily deformable silver coating applied.

JSC "NIIIEFA" has developed and justified the design of a collapsible connection with a system of sealing rings, and also developed an installation for conducting vacuum helium tests by the mass spectrometric leak detection method.

In 2022 and early 2023, the first series of tests of a demountable connection using HTMS rings was carried out, and the results of these tests were published. At the moment, the full scope of the planned tests has been carried out, as well as a comparative analysis of two types of seals has been performed, which allowed us to get a complete view of the feasibility and operability of this method.

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^{*)} [abstracts of this report in Russian](#)