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P3.014 Pre-qualification of the ELM resilient long pulse WEST ICRF launchers in the TITAN testbed

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Before their installation and commissioning in the tokamak, WEST ICRF launchers undergo two categories of pre-qualifications tests. These tests aim at accelerating the commissioning of the launchers in the tokamak. The first category of tests is milliwatt-range radio-frequency (RF) experiments which allow checking the launchers coupling capabilities, impedance matching and their load-resilience. See detailed in accompanying paper (W. Helou, et al., this conference).

The second category of tests is performed in the TITAN vacuum chamber and is detailed in this article. In particular, the adopted procedures for the latter tests are described. The TITAN vacuum vessel is designed to welcome WEST ICRF launchers, but also to provide ITER relevant vacuum condition, with dimensions compatible with 1/4th of the ITER antenna. This equipment is composed by a tank, pumping system, baking system.

When installed in the vacuum chamber, the launcher undergoes at first thermal cycling experiments. These experiments aim at testing the vacuum tightness of the full assembled launcher. In particular the tightness of all water cooling circuits is checked. This step is mandatory prior the installation in the machine, in order to avoid any leak during experiments.

Once the vacuum tightness validated, the launcher undergoes high RF voltage experiments. In these experiments the RF voltages and currents at the launcher's front-face are raised to the values corresponding to the plasma operation (27 kV and 915 A). Hence, these high RF voltage experiments allow validating the voltage standoff of the launchers. A dedicated process is used to increase step by step the voltage and duration of RF pulses. A description of this process is included. At the same time, the security systems, and in particular, the various arc detection systems are commissioned. All these procedures used by staged approach, will be discussed within the ITER ICRH team for their own antenna.

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