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## **P3.007 Fusion device components Hot Helium Leak Test facilities main requirement and lessons learned from the WEST project**

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Actively Cooled Plasma Facing Components (ACPFC) are required to allow for long plasma discharges in magnetic fusion devices. Prior to their installation, the integrity of ACPFC has to be checked under relevant experimental conditions in order to prevent serious water leaks in the vacuum vessel.

Since 1990, the French Magnetic Fusion Research Institute (CEA/IRFM) has developed specific leak test procedures adapted to the different component types and operational constraints. Meanwhile several facilities have been built to perform Hot Helium Leak Tests (HHLT).

To ensure a high enough quality leak test, these facilities must meet certain criteria such as low helium residual value and high sensitivity in the test bed vessel (~5.10-11 Pa.m<sup>3</sup>/s). Specific technics are used to check the component under representative experimental conditions (i.e. pressurization up to 5 MPa, temperature range from 20 to 250°C) when carrying out the CEA IRFM special leak test procedures.

This paper describes the equipment that were developed to perform the HHTL and the different procedures applied. A summary of the results of the tests carried out on approximately 500 components during the WEST assembly period is also presented. The lessons learned from these tests led to some modifications of the procedures, in particular with respect to the number of thermal cycles, pressurization levels and cycling, and heating steps. The goal is to perform an adapted test ensuring a reliable result in as a short time as possible.

Some further optimizations of the test duration are eventually suggested, which could have a very important impact on the overall assembly schedule of fusion devices under construction, like in particular ITER.

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