

QUALITY ASSURANCE ON THE WELDING WORK DURING THE ASSEMBLY OF WENDELSTEIN 7-X

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At the Max-Planck-Institut für Plasmaphysik (IPP) in Greifswald (Germany) the stellarator experiment W7-X, is presently being assembled.

During this assembly many different weld connections are made, which are extremely essential for the proper functionality of the experiment. This concerns mainly the structural integrity and the leak tightness.

The quality requirements to the weld seams are high (mainly class B according to DIN EN ISO 5817), because the complex machine should operate certainly for more than 15 years and the possibility of any repair or change of important components is very low. The main tests methods used are the following:

- Visual tests: All weld seams, starting from weld preparation up to the final pass are inspected either by the welding supervisor or by QA. Special emphasis is put on the inner surfaces of the media-bearing cooling lines for Helium and water, which must be free of discolouration. For this a number of different videoscopes are used.
- Dye penetrant tests: The use of this test is always in competition with leak tests and cleanliness. It is mainly used in those places where it can be ensured that all impurities can be cleaned away. It is always made only after leak tests.
- Radiographic tests: These tests are mainly made on butt welds for thicker components or on tubes where VT is not possible because of restricted access.
- Leak tests: These tests are mainly made locally with special vacuum chambers at different temperatures from hot to cold.
- Permeability tests: At least 10 % of all welds are tested, using a magnetoscope. A maximum value of 1.05 is allowed
- Macros: For the qualification of all welds macros are always made before the process is released. Especially for the welding on the Aluminum jacket of the superconductor macros are always prepared before each weld to check for the quality of the jacket material
- The paper will describe the applications of these different methods in more detail and will provide an analysis about the most critical welds and the ways to guarantee the necessary quality of the welding work.