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FEATURES OF ITER SUBSYSTEMS MANUFACTURING USING THE EXAMPLE OF THE PORT-PLUG TEST FACILITY (PPTF) ^{*)}

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1 PPTF (Port Plug Test Facility) – scope of delivery to ITER

- vacuum test stand for the ITER equatorial and upper port plugs with a loading system are designed to conduct climatic and functional tests of the port plugs before their direct operation in the ITER Tokamak. A total of 4 PPTF stands will be delivered.
- scope of work under P.A.5.8.P1.RF.01:
 - 2 stands in non-nuclear design;
 - 2 stands in nuclear design;
 - 1 pressure suppression system in nuclear design.

2 Features of manufacturing some subsystems

2.1 Chamber flange

- selection of weld types, coordination with ITER;
- unique ultrasonic testing using the phased array method on austenitic steel 1.4404 with a thickness of 310 mm;
- annealing in a vacuum furnace to relieve stress after welding (~1020 °C);
- final machining and dimensional control after machining (according to ITER Metrology Book).

2.2 Distribution platform

- precision welding of 12 m long channels;
- layer-by-layer control of all seams with penetrant;
- checking of leashes after welding;
- machining after welding (mobile machine);
- dimensional control after machining.

2.3 Vacuum chamber

- rolling (bending) of shells;
- welding of bottoms;
- cutting of holes;
- welding of nozzles;
- leak testing;
- manufacturing of tooling for ultrasonic testing;
- ultrasonic testing of each seam (shells, pipes, bottom);
- flange welding;
- manufacturing of hardware from Inconel 660 and 718 (machining, turning);
- setting up chamber supports before welding with the chamber using a laser tracker;
- dimensional control of the chamber and pipes.

2.4 Adapter

- bending of 1.4404 sheets with a thickness of 30 and 60 mm;
- welding of shells;
- dimensional control;
- welding of shells together (30+60 mm);
- layer-by-layer NRC control (capillary control);
- final machining;
- dimensional control (dimensions, angles, holes).
- welding with bellows
- manufacturing of internal and external sealing flanges EPP and UPP (4 pcs);
- dimensional control (accuracy 0.3 mm per 1 m);
- welding of flanges with bellows (three-layer bellows and welding with austenitic steel 1.4404).

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