Contribution ID: **1166** Type: **not specified**

P3.119 FABRICATION ROUTE OF THE ANSALDO-ENEA ITER INNER VERTICAL TARGET DIVERTOR FULL SCALE PROTOTYPE

Wednesday, 19 September 2018 11:00 (2 hours)

The scope of contract F4E-OPE-138 Lot 1, assigned to Ansaldo Nucleare S.p.A (ANN) by Fusion for Energy, the EU-Domestic Agency, is the fabrication and qualification of a representative full scale prototype of the International Thermonuclear Experimental Reactor (ITER) divertor inner vertical target which procurement falls under the EU responsibility.
ENEA, as major partner of the contract activities, was in charge of the plasma facing units (PFU) fabrication by means of Hot Radial Pressing (HRP) process and responsible for the CuCrZr/Cu joined interfaces non-destructive examination which was performed by ultrasonic water gap technique by means of a dedicated equipment designed by ENEA itself.
In parallel the other main fabrication steps (W monoblock preparation, brazing of the XM-19 support, CAM machining of the steel support structure and test frame, welding, dimensional checks, etc.) were completed by ANN and its industrial partners based on the F4E technical requirements.
The feasibility of the prototype assembly by integrating the PFUs onto the steel support structure has been demonstrated and the technical capability to reach the tight geometrical tolerances required for the plasma surface is being checked and will be reported.
The high heat flux thermal fatigue testing that will take place during 2018 on the ITER Divertor Test Facility at Efremov Institute in Saint-Petersburg on 8 full-W PFUs installed on the testing frame, is aimed at finally demonstrating the PFUs thermal capability to remove up to 20 MW/m2 during transient events of 10 seconds, while normal operation heat flux on the bottom segment of the divertor is up to 10 MW/m2 steady state.
The reliability level reached by the HRP joining process and the industrial consolidation of the fabrication route, paves the way with confidence to a forthcoming series production of the ITER full-W divertor. The paper reports the full scale prototype main production achievements.

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Session Classification: P3