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Design, Research and Development of CFETR Vacuum Vessel

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The vacuum vessel, as one of the important components for the Chinese Fusion Engineering Testing Reactor (CFETR) superconducting magnet Tokamak, can provide ultra-high vacuum and clean environment for the plasma operation. The CFETR vacuum vessel was preliminary designed to be a torus with D-shaped cross-section, 4 upper vertical ports, 8 lower ports and 6 equatorial ports, which will be introduced detailed in the paper firstly. In order to verify the design and key technology to be used in the future, 1/8 VV sector mockup is designed and manufactured in ASIPP now. It was used to demonstrate the make forming, welding, cutting, NDT processing and all kind of tools technology and development. Main design parameter and characteristic of the 1/8 VV sector mockup was introduced secondly, including the inner shells, outer shells and stiffening ribs between them, straight line, arcs and the tangential joint between them. As the results of calculating thermal Analysis, structural analyses under the combined loads of gravity, electromagnetic and neutron thermal radiation, stress and deformation on CFETR VV can be obtained, which is useful for the structural design of VV. At last the Research and Development (R&D) of key technologies to the VV manufacture which have been carried out in ASIPP and the assembly technology for the 1/32 VV sector mockup were discussed and introduced.

Keywords: CFETR vacuum vessel; structural analysis; Assembly sequence; Research and Development (R&D)

Eligible for student paper award?

No

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