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NEUTRONIC SHIELDING DESIGN OF THE ITER EC UPPER LAUNCHER

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In four of the upper ports of ITER, Electron Cyclotron launchers will be installed for heating and plasma stabilization. The launchers are designed as stainless steel casks (so-called port plugs), accommodating microwave mirrors and waveguides with the capability to inject up to 24 MW total microwave power into the plasma.

The inner volume of the port plugs represents a relatively open structure which is unavoidable since the propagation of the microwave beams shall not interfere with any structural components. Thus it is essential to fill all remaining volumes with shielding components to guarantee the compliance of the launchers with the neutronic design requirements.

That is why the EC upper launchers will be armed with three particular shielding elements, of which the first one is installed into the upper area of the plasma-facing Blanket Shield Module, the second one in the front area of the launcher main structure and the third one in its rear part. All shielding components must be equipped with suitable internal cooling structures regarding volumetric heat dissipation, acceptable pressure drop and proper steel/water ratio for optimum shielding performance.

This paper outlines the general design of the shielding components, including mechanical structure, cooling layout and integration, interfaces with the MW-components, manufacturing, installation and maintenance aspects. Also analyses to prove mechanical integrity, thermo-hydraulic behavior and shielding capability will be presented.

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