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## Design of the ITER EC upper launcher nuclear shielding

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ITER will be equipped with four EC (Electron Cyclotron) upper launchers of 8 MW microwave power each with the aim to counteract plasma instabilities during operation. These launcher antennas will be installed into four upper ports of the ITER vacuum vessel.

Beside their functional purpose the port plugs which are the structural system of the launchers have to provide as much shielding as possible in order to protect adjacent components from neutrons and photons and to minimize the shutdown dose rate in the port interspace and the port cell, being located further back in the ITER Tokamak building.

In addition to the basic design of the port plug cask several components are particularly shaped in order to achieve maximum shielding performance. Moreover three individual shield blocks will be installed at prominent positions inside the plug.

This paper presents the general design, the technical integration and mechanical stress analyses for all shielding components. Also the thermal-hydraulic properties and the integration of these water-cooled elements into the port plug's cooling circuit are outlined.

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