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EX/4-3: On the Challenge of Plasma Heating with the JET Metallic Wall

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In this contribution, the major aspects linked to the use of the JET heating systems: NBI, ICRF and LHCD, in an ITER-like wall will be presented. We will show that although each system had its own issues, efficient and safe plasma heating was obtained with still room on each system for higher power. For the NBI up to 21 MW was safely coupled, issues that had to be tackled were for example the beam shine through and the beam “re-ionisation”. For the ICRF system, that has coupled 5 MW in L-mode and 3 MW H-mode, the main area of concern was linked to acceleration of ions in the sheath rectified voltages created by the residual parallel electric field on the antenna structure and related heat loads and impurities production. For the LH, arcing and generation of fast electron beams in front of the launcher that can lead to high heat loads were the keys issues but 2.5 MW were delivered without problems. For each system, an overview will be given of their compatibility with the new Be / W first wall, of the main modifications implemented to be able to use them in a metallic environment and a review of differences in behavior compared with the previously installed first wall in C, with special emphasis on impurity content in the plasma and heat loads on the first wall. When relevant, the JET experience will be put in the context of ITER.

Country or International Organization of Primary Author

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Collaboration (if applicable, e.g., International Tokamak Physics Activities)

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