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# Design of Divertor and First Wall for DEMO-FNS

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In this report we discuss key issues of design of the divertor and the first wall of DEMO-FNS. Parameters determining heat loads on the wall and on the divertor targets are similar to those of ITER. Therefore, technologies being developed for ITER project may be partly used in DEMO-FNS design.
As a result of analysis of modern solutions and a simple hybrid modelling, a double null close magnetic configuration was chosen with a long external leg and a V-shaped corner that are preferable for obtaining the detachment regime. The divertor has a modular design like in ITER. The number of divertor cassettes is equal to 48=3⊠N, where N=16 is the number of toroidal magnetic coils. Water cooled first wall of the tokamak is made of Be-CuCrZr-SS. It functions as a stabilizer of MHD instabilities.
Calculations of thermal loads on the wall and divertor plates done with a simple hybrid model were enhanced using a 1D code ASTRA for the core plasma, and a 2D code B2SOLPS5.2 for peripheral plasma. The calculations have shown that it is possible to organize the heat load distribution so that the heat flux density does not exceed 10 MW/m2 on the divertor plates. Addition of a small amount of neon with no significant impact on the effective charge of the core plasma allows obtaining regimes of partial detachment or detached divertor plasmas.
Surfaces of wall and divertor plates are covered by beryllium tiles. In the project, the usage of liquid lithium on plasma facing components is foreseen. Circulation of lithium will contribute to a reduction of impurities in the plasma core, a reduction of heat flux through «non-coronal radiation» of lithium, and to protection of solid-state plasma facing components from radiation damages by fast alpha-particles.
New test bed experiments with a flat mockup of the first wall coated by beryllium tiles and cooled by water will be presented in the report, which were made on CEFEY-M facility. The temperature of the surface of a beryllium plates reached 280-300 C at 5 MW/m2 and 600-650 C at 10.5 MW/m2. The mockup successfully sustained 1000 cyclic loads with the lower power and 100 cyclic loads with the higher power. None of the beryllium plates lost the thermal contact with the coolant. The design can be recommended for divertor plates to make a machine with mono-material plasma facing components.

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