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# Superconducting Magnet for Russian Fusion Neutron Source DEMO-TIN

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The presentation describes the conceptual design of the superconducting magnet (SC) of the fusion neutron source DEMO-TIN that is now under development in Russia and the estimations of the mechanical and electrical loads in it, its shielding, as well as cooling and other performances. The main parameters of that device are as follows: plasma major radius R0 = 2.5 m, minor radius of the plasma column apl = 1 m, elongation k = 2.1, plasma current Ipl = 5 MA. The magnet should produce the toroidal field (TF) on the plasma axis B0 = 5 T, and that in the coils Bm = 12 T. Coils outer dimensions are 9 m x 5 m, their radial thickness is 0.5 m, inner bore radius for inductor Ri = 0.5 m. The shield thickness for protection against irradiation between the coils and the vacuum vessel is equal to 0.5 m. Therefore the space for TF magnet legs comes out very small and the current density is 27 MA/m2 which is considerably higher than in existing magnets. Magnet will use the Nb3Sn wire produced at present for ITER magnet at Chepetsk engineering works in Russia. In principle the fabrication of such magnet is possible, however it has too small margins in estimated mechanical stresses in coil cases, in the number of wires for required current-carrying capacity, in the cross section of high-conductivity stabilizing material and in the proper cooling of magnet. Therefore, the application of high-temperature SC materials is strongly preferable for such magnet although it requires more R&D for its design and fabrication. However designing and testing of current-carrying cable, the model coil with it and then the prototype coil are necessary in all cases.

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