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## FINAL DESIGN CHALLENGES OF THE ITER DIVERTOR NEUTRON FLUX MONITOR <sup>\*)</sup>

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The paper discusses the progress in the development of the ITER Divertor Neutron Flux Monitor (DNFM). The concept of DNFM diagnostic aimed at the assessment of the total neutron yield and fusion power of the ITER tokamak is based on the possibility of measurements with an unprecedented dynamic range, time resolution and accuracy. For this purpose, diagnostics based on 3 subsystems is proposed as the main design solution, each subsystem consists of 6 independent fission chambers (FCs) with a variable amount and isotopic composition of the fissile material. DNFM is one of the key components of the ITER neutron diagnostics complex, which must be absolutely calibrated. Calibration of key neutron diagnostics is planned to be carried out by placing a fast neutron source inside the vacuum chamber after assembly of the tokamak.

The report provides an overview of the current design state and justification of the technical solutions adopted for this system. Structural integrity analysis confirms DNFM compliance with the harsh conditions of the ITER vacuum chamber, including seismic, thermal, electromagnetic and radiation loads. A special place in this review is occupied by the DNFM data acquisition system and aspects of its integration with Plasma Control System. Each fission chamber is equipped with several signal chains in order to significantly expand the dynamic range of measurements. This also increases the reliability and availability of diagnostics in the long term. Aspects of radiation compatibility of electronics located in ITER port cells are also discussed. The multi-stage calibration strategy provided for DNFM diagnostics includes determining the characteristics of commercially available FCs under irradiation with fast DD and DT neutrons, factory calibration of detector units and, finally, determining the calibration coefficients at the tokamak site after assembly.

The DNFM project is approaching the manufacturing stage, and this report summarizes the main challenges and ways to overcome them for this fusion power diagnostics of the ITER tokamak.

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