

Progress in the conceptual design of the European DEMO magnet feeders

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The magnet feeders are critical systems of fusion reactors since they represent the interface between the in-cryostat components and the external environment. By realising the required electrical, cryogenic and mechanical connections, as well as hosting instrumentation cables, the feeders ensure the safe operation of the superconducting magnets. Therefore, the design and integration study of the magnet feeders is one of the key activities within the conceptual design phase of the European DEMO. Despite several preliminary studies have been performed, a systematic overview of the feeder system is still missing.

In this work, we report recent progress in the design of the magnet feeders, starting from the outline design of the superconducting bus bars and current leads, which connect the room-temperature power supply to the coils at about 4 K. Further design activities have been centred on the integration of the feeder structures within the tokamak building, considering also the positioning of additional critical components, such as the auxiliary cold boxes and the fast discharge units. The process flow diagram of the feeders for the toroidal field coils has been also introduced, with a particular focus on the operation of the cryogenic lines at different temperature and pressure levels.

We believe this work is relevant for advancing the design of the whole European DEMO fusion reactor, representing a solid starting point for future engineering design activities and industrial studies.

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