

Preliminary design of the pressure relief system for the new EDIPO He vessel

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The EDIPO test facility is undergoing a major upgrade of its magnet assembly, which will provide ground for testing both fusion and high-energy physics superconducting samples at variable temperature and with a background field of 15 T. Unlike the former magnet, which was wound with cable-in-conduit conductors cooled by a forced-flow of supercritical He, the upgraded magnet assembly will be cooled in a bath of liquid He at atmospheric pressure. Therefore, the structural design of the He vessel hosting the magnet calls for a preliminary design of its pressure relief system.

In this work, we discuss the cryogenic requirements of the He vessel, starting from a cooling configuration based on a saturated bath. We present a design based on a staged pressure relief concept, which is dealt with in two steps. In the first step, after having defined the target pressure levels, possible accidental scenarios are considered for sizing the safety relief devices. In the second step, the heat loads in normal operation are estimated for modelling the pressure relief and He recovery. For this purpose, the description of a magnet quench event is investigated, considering the fraction of the quench heat load transferred to the He bath.

Category

Multi-scale and multi physics design methods

Keywords

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