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Tue-Af-Po2.15-04 [15]: Redesign and Strength Check of 40T Hybrid Magnet Thermal Shield

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The 40T hybrid magnet in Hefei consisting of a 10 T superconducting outsert and a 30 T resistive insert magnet has passed the national evaluation in 2017 and has been running steadily up to now. The thermal shield cooled by liquid nitrogen sandwiched by the superconducting magnet and the water-cooled resistive magnet is the important component of the hybrid magnet. During the debugging phase of the hybrid magnet in 2016, a trip of the water-cooled resistive magnet triggered the quench protection of the superconducting magnet, resulting in expansion and rupture of the oxygen-free copper thermal shield. In this paper, we will reveal the reason of damage of the oxygen-free copper thermal shield via the finite element simulation analysis. We also introduce a new design scheme of the thermal shield adopted by the 40 T hybrid magnet which is currently operating steadily.

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