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Design, Testing and Commissioning of 25.7 kA HTS Current Leads

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Superconducting high field magnets use the principle of superconductivity of the material, thus working with very high current density in thin cables. The cables are cooled down to cryogenic temperatures inside of a vacuum insulated cold box. In order to feed the high current into the cold box, it is important to cool down the conductors progressively. The less coolant is needed for current unit, the more efficient is the system. Hybrid current leads, using the properties of BSCCO 2223 (High Temperature Superconductor), have an almost-zero resistivity already at higher temperatures around 50 K and are a very efficient way to reduce the consumption of cooling energy. This philosophy has been applied to a pair of 25.7kA current leads, aimed for a magnet test facility of CEA Saclay for verifying the Toroidal Field Coils of the Tokamak JT-60SA. This contribution describes the design features and parameter and its confirmation through the first commissioning results.

Submitters Country

Switzerland, France

Primary authors: CONSOGNO, Guido (WEKA AG); BOERSCH, Michael (WEKA AG); ERNI, Pascal (WEKA AG); Dr ABDEL-MAKSoud, Walid (CEA); Mr GENINI, Laurent (CEA/IRFU)

Presenter: CONSOGNO, Guido (WEKA AG)

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