

CORLESS INDUCTIVE SUPERCONDUCTING FAULT CURRENT LIMITERS

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ABSTRACT *The electrodynamic forces occurring during the course of a fault current may damage the devices of the electric power system within tens of milliseconds. Every such failure of an electric power network entails expensive and time-consuming repairs. Therefore, it is vital that the network's operation be secured with a reliable protection system. A superconducting fault current limiter (SFCL) is an electrical device with a negligible impedance in normal operating conditions that switches to a high impedance state during fault, limiting short circuit current. SFCLs react very rapidly by limiting the first, the most dangerous, surge current during a current fault condition, thus protecting the devices of the electric power network from the dynamic effects of current faults.*

This paper discusses the main issues concerning the new coreless constructions of inductive type fault current limiters with rated parameters 6.9 kV / 600 A and 15 kV / 140 A. Compact design of the coreless superconducting fault current limiter consists of three magnetically coupled windings cooled in liquid nitrogen. The presented coreless constructions of current limiters have low weight and the voltage on the limiter during the normal operation is negligible. The paper presents the designs and numerical models of the limiters and presents the results of tests performed at a high-power test facility. The paper also contains the results of experimental research on second generation superconducting tapes, they are necessary to make numerical models of superconducting current limiters.

Keywords: *superconducting fault current limiter, coreless, superconducting tapes, short-circuit test, liquid nitrogen*