First Russian 220 kV Superconducting Fault Current Limiter for Application in City Grid

M. Moyzykh, D. Gorbunova, P. Ustyuzhanin, D. Sotnikov, K. Baburin, A. Maklakov, E. Magommedov, A. Shumkov, A. Telnova, V. Shcherbakov, D. Kumarov, L. Sabirov, M. Medovik, A.Kadyrbaev, S. Alexandrov, I. Mikoyan, S. Samoilenkov and A.Vavilov

SuperOx, Moscow, Russia

***Abstract*— The SFCL for a voltage class of 220 kV and rated current of 1200 A was developed by SuperOx company to be applied at HV grid substation in Moscow. The device is a three-phase dead-tank apparatus and is equipped with a fully reserved close-cycle cryocooling system with a liquid nitrogen serving simultaneously as a cooling and an insulating media. The device makes use of more than 25 km of 12 mm wide high performance 2G HTS wire with extremely uniform properties along the length. High-voltage tests of the device were performed at KERI test center in accordance with the IEEE C37.302-2015 guidelines and national standards for electrical equipment. In particular, SFCL phases were tested to withstand 440 kV AC voltage for 1 minute and 950 kV lightning impulse. In order to better understand the influence of SFCL on the power grid, a digital model of the device has been developed and verified by comparison with results of high-power tests. The installation of the SFCL at substation in parallel with the existing air core reactors was completed in 2019. This report will present details of design, tests and operation of 220 kV SFCL in Moscow grid.**

***Keywords (Index Terms)* — High temperature superconductors, superconducting fault current limiter, cryogenic power equipment, electrical grid.**

IEEE CSC & ESAS SUPERCONDUCTIVITY NEWS FORUM (global edition), March 2021.
Submitted February 11, 2021; Selected February 12, 2021. Reference STP666; Category 6.
Presentation Wk2LOr3E-01 was given at the virtual ASC 2020, October 29, 2020.