

Implementation of a 2400-meter Long HTS Cable Line Project in the Power System of St. Petersburg

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Abstract—The development of technologies for the production of high-temperature superconducting tapes, as well as technologies for the development and production of equipment based on superconductivity, leads to the fact that the development and implementation of superconducting electrical equipment in the electric grid complex is becoming very effective. An example of the effective implementation of HTS superconducting devices is the development and installation in the St. Petersburg power grid of a record-breaking long superconducting DC cable line with a transmitted power of 50 MW at 20 kV. The line consists of a superconducting cable, two converter substations, a cryogenic system and a control and protection system. The cryogenic circuit is about 5,000 meters long. The HTS line was installed in the center of St. Petersburg in a densely built-up area and connects the 330 kV substation Tsentralnaya with the 110 kV substation RP9. The report presents the stages of development and installation of all elements of the cable line and testing results of the assembled line. The characteristics of the line during transmission of rated power are described.

Keywords (Index Terms)— Energy Transmission, HTS Cable, Critical Current Density, Cryogenics, Power grid