

Cryogenic and Electrical Test Results of a 30 M HTS Power Cable

V. E. Sytnikov¹, V. S. Vysotsky¹, S. S. Fetisov¹, A. A. Nosov¹, Yu.G.Shakaryan²,
V.I.Kochkin², A.N.Kiselev², Yu.A. Terentyev², V.M.Patrikeev³, V.V.Zubko⁴

¹Russian Scientific R&D Cable Institute, 111024, Moscow, Russia

²R&D Center for Power Engineering, 115201, Moscow, Russia

³RSC "Kurchatov Institute", 123182 Moscow, Russia

⁴Institute for High Energy Physics, 142281, Protvino, Russia

Abstract - In the framework of the Russian R&D Program for high-temperature superconducting (HTS) power devices, a three-phase, 30-m-long cable carrying a current of ~1.5-2 kA under the 20 kV operating voltage was delivered by the Russian Scientific R&D Cable Institute as the first stage of the HTS power cable project. Various basic HTS materials, cryostats and current leads were incorporated into the cable design in this essentially research part of the project. The cable is being tested at the special test facility for superconducting power devices developed at the R&D Center for Power Engineering. The cryogenic system for the test facility was delivered by Stirling. The basic cryogenic system was equipped with a specially developed flow distribution unit. This unit permitted variation and control of liquid nitrogen flows, pressure and temperatures in all three cable phases. Dependencies on temperature of critical currents of each phase were measured during the cable test. The results of this project's first stage were used to develop and produce a 3x200m cable system for the Moscow distribution grid. In this paper, results of cryogenic system tests and cable electrical tests are presented.

Keywords - superconducting power cable, HTS, cryogenic systems, cable test

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