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AmpaCity Project – Advanced Superconducting 10 kV System

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Abstract

In recent years significant progress has been made in the development of high temperature superconducting (HTS) power devices, in particular cables and fault current limiters. Several field tests of large scale prototypes for both applications have been successfully accomplished and the technologies are getting closer to commercialization.

In this lecture the German AmpaCity project, which started in September 2011, will be introduced and the conceptual design of the main components will be described. The objective of the project is developing, manufacturing and installing a 10 kV, 40 MVA HTS system consisting of a fault current limiter and of a 1 km cable in the city of Essen. Since it is the first time that a one kilometer HTS cable system will be installed together with an HTS fault current limiter in a real grid application within a city center area, AmpaCity serves as a lighthouse project. In addition it will be worldwide the longest installed HTS cable system. Within the project the development phase finished in March 2013 with successfully completing the type test of the cable system. After that, manufacturing of the different components for the installation started and the system was officially commissioned by the end of April, 2014.

The widespread use of HTS cables and fault current limiters depends upon the extent to which it is possible to improve the price performance ratio of HTS materials and to optimize manufacturing of cables as well as the cost and reliability of the required cooling technology. It is to be expected that relatively large technical advances will be made in the future of the comparatively new HTS technology, which in turn will bring associated cost reductions. For this reason, the AmpaCity pilot project in the downtown area of Essen in Germany will be an important step on the way to achieving more widespread application of HTS technology.