

HTS Cable Design and Evaluation in YOKOHAMA Project

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Abstract - HTS cable demonstration project supported by Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO) has started since FY 2007 in Japan. The target of this project is to operate a 66 kV, 200 MVA HTS cable in the live network of Tokyo Electric Power Company (TEPCO) in order to demonstrate its reliability and stable operation. Various preliminary tests with the short core samples were conducted to confirm the HTS cable design. One of the technical targets in this project is to reduce the AC losses of HTS cable cores. For this purpose, a new type DI-BSCCO wire with twisted superconducting filaments which is named TypeAC is applied in the cable core. A short cable core made with TypeAC wires shows its AC loss is 0.8 W/m/ph at 2 kArms, which is about 1/4 of the one with standard DI-BSCCO wires. Another important target is to manage a fault current. At a preliminary test with the short cable cores, it showed that the cable could manage the through-fault of 10 kA at 2 sec and survived at 31.5 kA at 2 sec. As the electric insulation tests, AC 90 kV for 3 hours and lightning impulse at ± 385 kV, 3 shots for each were applied to a cable core, successfully. The results of tensile and bending tests showed the cable core has good mechanical properties. The design of the HTS cable for YOKOHAMA project has been completed as well as those of a termination and a joint. A 30-meter HTS cable was manufactured and a 30-meter HTS cable system was installed in SEI facility. The cable system was cooled down and tested to verify its performance before constructing the HTS cable system in YOKOHAMA. This paper describes the design and test results of the 30-meter HTS cable, and also performance test results of the 30-meter cable system.

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