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Prequalification test of 400 kV XLPE cable system

W.K. PARK*, S.I. JEON*, S.G. CHOI*, Wouter J.W.M. Sloot**, Edwin Pultrum**

*LG Cable Ltd., 190 kongdan-dong, Gumi City, Gyeong-buk, Korea

** KEMA, Utrechtseweg 310, 6812 Ar Arnhem, the Netherlands

In this paper, the type and prequalification test at KEMA as well as the development test performed at LG Cable for 400 kV XLPE cable system in accordance with the new IEC 62067 will be described in detail.

As the city is modernized and expanded in size, the underground transmission system needs to be upgraded for the higher transmission voltage and larger amperage. Thus, 400 kV XLPE cable system was developed and tested to satisfy the current demand.

The cable was produced from the super clean compound with in-line monitoring system in the extrusion process. Under the strict quality control, the minimum electrical breakdown strength has been increased from 50 kV/mm to 75 kV/mm for Impulse.

Accessories were manufactured as prefabricated type, which allowed the simple and easy assembly at the site of installation. AC and Impulse test terminations up to 1400 kV and 3600 kV, respectively were also devised using the capacitance cone to evaluate the cable system.

Specially designed tools as well as a clean booth made accurate installation work and clean environment below 20,000 cleanliness class.

After the completion of the type test at KEMA, the prequalification test was started to prove the safe operation at high stress and to evaluate its long-term reliability.

A total length of about 300 m is installed along with two outdoor terminations, two GIS sealing ends, and two joints in consideration of various actual laying conditions.

High frequency partial discharge (HFPD) measurements were carried out for monitoring the whole test circuit throughout the heating cycles.

During a one year period of heating cycles, the test objects were subjected to higher voltage (400 kV) than that of IEC 62067 (375 kV). Upon completion of the heating cycles, lightning and switching impulse voltage tests were performed.

The successful completion of the pre-qualification test ensures the long-term reliability of 400 kV XLPE cable system.