Development of Compact Designed 66/77kV Class XLPE Cable System

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There are demands to replace 3-core SCFF cables operated in duct for more than 30 years. From view point of environmental stress free, these cables shall be replaced to XLPE cable in coming decades. However, it's difficult to install the same size of XLPE cable in old duct for SCFF, due to difference in diameters. Therefore, there are needs to develop new products with same (or smaller) diameter as that of SCFF, and their accessories. This paper describes development activities of compact designed XLPE cable (which can be applied to existing duct) and accessories, mainly focused on electrical performance for 66/77kV class.

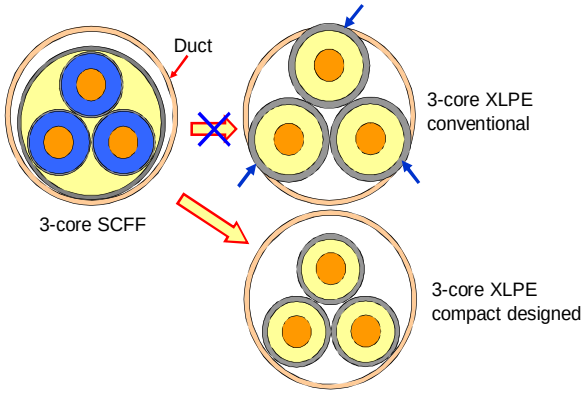

Fig.1 Cable dimensions in duct

1. The design features of developed products

   The new 3-core XLPE cable has smaller diameter by 10 to 20% mainly by reducing insulation layer thickness. Joint has the latest design with cold shrink technology which is easy to assemble on site. As for termination, two types are arranged. One is contemporary design "Type-I" which consists of EPDM rubber cone and porcelain bushing with silicone oil inside. Another is new developed dry outdoor termination "Type-II" which uses hollow composite type bushing and silicone gel instead of silicone oil as insulating compound inside the bushing.

2. Electrical performance of developed products

   Electrical stress tests were conducted on compact XLPE cable whose insulation thickness was set to smaller value than target design value, for development purpose. The test result showed good performances. Subsequently, a loading cycle test on 600 mm^2 compact designed XLPE cable system was carried out for 6 months based on JEC-3408 (Japanese domestic standard) to confirm long-term stability and reliability. Two types of outdoor terminations were arranged in the test circuit, too. The test results satisfied the requirements in accordance with JEC-3408.

Compact 66/77kV XLPE cable and accessories have been designed. These cable systems can be installed into duct for old SCFF, with the same ampacity of existing SCFF. Excellent electrical properties were confirmed of requirement in Japanese domestic standard (JEC-3408). This system has been already qualified for commercial application and is expected to be used for 66/77kV class application in the near future.