

Non-offset design of cables in man-hole considering the mechanical behavior of XLPE cables in duct

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When a power cable is subjected to a daily load cycle such as occurs on the majority of electric utility lines, it is alternately heated and cooled with the result that internal compressive and tensile stresses are built up by the variable temperature. These stresses are mainly relieved by the longitudinal movement of the cable into the manholes at either end of the individual lengths.

As this cable moves into and out of the manhole, the sheath of cable in manhole subjected to daily load cycles. Since this working may eventually cause cracking of the sheath before the end of the useful life of the cable, it is desirable to determine how to absorb the thermal expansions of the cables in the manhole. For solving this problem, the cable offset have adapted.

The dimensions of the cable offsets in man-holes should be selected for power cables in ducts so that they can absorb thermal expansions of the cables due to a load change. The dimensions of the offset have been designed to suppress the strain of the metallic sheath below the allowance values which are determined by KEPCO considering the equations of Bauer, Schifreen et al.

However these days there is a requirement for reducing the size of manholes because civil complaints have seriously occurred due to traffic congestion during construction of them. For reducing the size of the manhole, we have considered the non-offset design of cable in manhole as a solution. For adapting that, cable reliability should be studied.

Therefore, we have examined the behavior of cable in duct to confirm cable reliability when non-offset is applied in manhole. Also we also have measured compressive force of cable that built up by rising cable temperature in manhole.

This paper represents validity of non-offset of cable in manhole-duct system with the result of cable behavior in duct and the compressive force of cable in manhole.

Key words

XLPE cable; Offset design; Non-offset design; Mechanical behavior; Ducts and manholes