Development of pre-molded accessories for HVDC extruded cable system

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HVDC cable system applications and planning projects are increasingly publicized for the long distance link. And also, the needs for high quality and environment-friendly products both for accessories and cables are simultaneously enlarged. HVDC extruded insulation cable system has been developed to cope with such requirement accordingly.

With reference to the development of accessories for HVDC extruded cable, reliable solution had been on-site molded joint using same material as cable insulation which has been developed including long term test (conductor temperature=90°C) up to Uo=500kV, in Japan. (1) Uo=250kV pre-qualification test on this system in accordance with CIGRE TB-219 is on-going and will be completed soonest.

As another solution for example, special treatment such as field control layer should be needed to secure reliable insulation on the interface between cable and rubber unit for land joint with other cable. (2)

On the other hand, our HVDC XLPE material (3) have been developed has excellent characteristics in space charge behavior and insulation resistivity as a function of electric field and temperature. Thus, the compatibility of HVDC cable and pre-molded accessories without any special design such as field control layer has been evaluated by many experimental approaches, fundamental studies and electric field simulation to verify the feasibility of its combination.

DC basic properties such as high field resistivity and space charge behavior of several existing materials have been measured. Then, initial performance test and trial loading cycle test including Uo=200kV type test (CIGRE TB-219) have been carried out with scale-downed accessories composed from selected material, which is aiming to evaluate our pre-molded accessories’ performance at higher electric field expected Uo=500kV class. This has been completed successfully.

Currently, Uo=320kV type test is on-going, in which, GIS termination with rubber cone and pre-molded joint are included. These test results will reveal excellent properties and give great confident of HVDC XLPE cable system with pre-molded accessories (without special design).

Authors shall present state-of-the-art HVDC technology with pre-molded accessories without special design.