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GROUP REF. : SC B1
PREF. SUBJECT : 2
QUESTION N° : 2

- SC B1 – Insulated cables
- PS 2 – Future functionalities and applications
- Q 2 – With the increased interest in retrofitting fluid-filled cable systems (pipe-type in particular) with extruded cables, what trends in technology are necessary to enhance the application, including high-stress dielectric designs, temperature performance, bonding system design and the necessary accessories?

Application of HVDC GIS cable connection assemblies within extruded cable systems

The increasing demand of electrical energy requires the integration of renewable energy by use of multi-terminal HVDC interconnectors. Within the context of ongoing and planned HVDC links, the application of HVDC system voltage levels of up to $U_0 = \pm 525$ kV is intended. The associated technical challenges require the development and qualification of advanced HVDC systems as well as the combination of different HVDC technology solutions, such as cable systems and gas-insulated systems (DC GIS), especially in terms of space-saving installations. Connecting an HVDC cable directly to an HVDC GIS is part of several HVDC solutions, such as in converter stations, in transition stations or in switching stations.

Not only retrofitting fluid-filled cable systems with extruded cables, but especially new cable systems open the opportunity of direct connection between HVDC cable and HVDC GIS.

The combination of HVDC system components requires the consideration of specific design rules and individual test philosophies. The evaluation of the technical challenges is part of an ongoing CIGRE joint working group B1/B3/D1.79 “Recommendations for dielectric testing of HVDC gas insulated system cable sealing ends”. However, some type test procedures of HVDC GIS cable connection assemblies for $U_0 = \pm 525$ kV have already been conducted on the basis of CIGRE TB 496/852. The respective interface configuration was following standard IEC 62271-209 with respect to dimensions and scope split between cable manufacturer and GIS manufacturer.

The type test procedures have been conducted according to international standards and HVDC cable system recommendations with third party certification. The test profiles comprise of mechanical pre-conditioning of the cables, heating cycle voltage tests, lightning and switching superimposed voltage tests, and a subsequent DC voltage test. The successfully passed type test sequences confirm the integrity of the involved interfaces.