A.6.5.

Design of plug-in hV-connex cable termination system for XLPE- high voltage cable up to U_m = 245 kV

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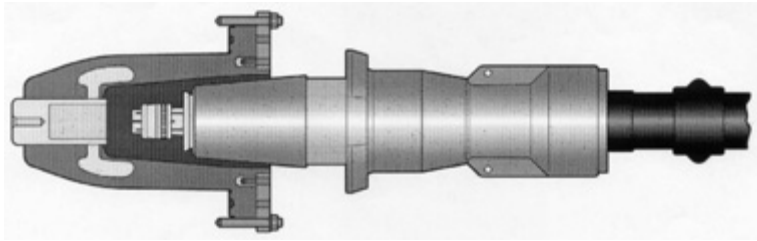
For 110 kV cables with XLPE insulation now in increasing use, new compact cable termination systems have been available since early 1996. The proposed cable termination system Size 5-S has filled a gap, for connection of the new series of transformers, joint boxes and gas-insulated switchgear to the cable sections, using an adequate connection technology in a space-saving way and allowing secure and rapid assembly according to IEC 60859 for dry type cable connection. The conventional wet-installation sealing ends according to IEC 60859 for fluid filled cable connection with their assembly expenditure will be replaced in the medium term. In the meantime, more than 2000 of these plug-in dry-type cable termination systems are operating worldwide without any problems in cable networks U_m =145 kV.



Following the demand in the market, we have developed in 2000 a cable-Termination System size 6-S for a rated voltage of 245 kV and a cable cross section up to 1600 mm^2.

The compact HV separable cable connector consisting of preassembled factory-inspected components permits shorter assembly times, simple working procedures and more reliable assembly, thus contributing to a safer connecting technique at the 245 kV.

GIS Facilities

In the period from the mid-80s to the mid-90s, the inside cone cable termination of SF_6 insulated circuit-breaker switchgear in medium voltages has become dominant. The advantages already described in detail in common conferences worldwide have been fully confirmed by the operation practice too. This has doubtless contributed to the widespread use all over the world of our HV Cable Termination System; at present more than 1,000,000 Cable Termination Systems of our company are in use for medium voltages all over the world. Since mid -1996, GIS facilities have been equipped and put into service

with our Cable Termination System in the voltage range U_m = 145 kV too. Adaptation to conventional GIS facilities was performed in the conventional cable termination module using an IEC extension apapter. The new compact GIS design with maximum function integration are alredy equipped as standard with the shortened cable termination modules for receiving modern HV compact sealing ends.

Transformer

Over the past 15 years a large proportion of the 110/20 kV transformers presently in operation have been equipped with multi-contact elbow bushings the lower voltage side for connection with inside cone cable termination heads. Using the HV Cable Termination System, the advantages of the intrinsically safe and fully enclosed plug-in cable termination technology are at the use at the upper-voltage side too. With the modular HV Cable Termination System, almost every conceivable application is covered.

Plug-in joint boxes

With the HV System, it is possible to provide with only a few components plug-in joint boxes for various geometrical cable configurations. The advantage of these joint-boxes is that the so-called joint box body is one unit, which is made and tested completely inside the factory. Solutions of this type offer enormous advantages, if for example cables have to be relaid several times during a construction and conversion phase were easy connectability comes into its own. However, joint boxes of this type can also be used for the implementation of new and inexpensive mains configurations; for example with a joint box of this type it is possible to:

- connect a second outgoing unit to a GIS bay;
- branch a ring main cable and insert a unit with transformer;
- easy separation and reconnection of the affected cable after a fault;
- additional and easy access for cable testing, whereby each cable branch can be tested separatly.

Prefabricated and tested cable lines

Prefabricated HV cable system, avaible with dry type plug in termination for GIS or Transformer with interface according to IEC 60859 allows the flexible and short connection of the electrical equipment to a high degree of standardisation and prefabrication. The advantages are short delivery times, quick installation time, there is no cable specialist required at the place of use and opening of the cable termination compartment – involving expensive gas or oil work – is not necessary unlike the usual fluid filled IEC 60859 connection, since the bushings has already been installed in the factory and the HV System is easy to plug.