CIGRE WG B1.42:"Recommendations for Testing DC Transition Joints for Power Transmission at a rated voltage up to 500 kV".

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This paper summarizes the work of CIGRE Working Group B1.42 installed by CIGRE Study Committee B1 (Insulated Cables) in 2012 to provide "Recommendations for Testing DC Transition Joints for Power Transmission at a rated voltage up to 500 kV".

HVDC cables with lapped insulation systems have been in operation since the 1950s and this technology is still dominating for long cable circuits at the highest voltage levels. Most of the lapped cable systems are based on kraft paper impregnated with a high viscous mass, but self contained fluid filled cables are also in operation in HVDC systems. Polypropylene laminated paper inpregnated with low viscous oil is also in service and mass impregnated PPLP insulation systems are developed.

Extruded insulation systems have been gradually introduced in the market the last two decades. Starting at a voltage level of 80 kV in the late 90s this cable technology is today dominating for voltage levels up to 320 kV. Further development of the technology for higher voltage levels is expected.

The number of HVDC circuits in operation has increased significantly for many years and it is expected that joints between paper lapped cables and extruded cables will be required in the near future. Transition joints may be required in new systems using different cable technologies along the route or for rerouting/replacement of parts of existing cable systems.

The brochure gives recommendations on how transition joints between lapped insulation systems and extruded insulation systems shall be qualified. The tests are as far as applicable based on existing Cigre recommendations in TB 496, TB 415 and tests specified for lapped HVDC cables published in Electra No. 189. There is a large variation in the maximum conductor temperature for the different insulation systems which needs to be taken into account during system engineering and testing. Some of the insulation systems are limited to 50 o C operating temperature and others are designed to operate at 90 o C. The axial heat transfer in the transition joint may therefore be high and has to be considered. An example of such calculation is given in the brochure.

Chapter one is an Introduction reminding the background and the scope of the work.

Definitions are given in Chapter two

Development Tests are addressed in Chapter three

Routine tests, sample tests and type tests are addressed in Chapters four, five and six.

Chapter 7 introduces prequalification tests including range of approval.

Chapter 8 deals with electrical test after installation.

References are given and four appendixes are provided to give examples

The Work of B1.42, introduced by this paper and soon published by CIGRE will be taken into consideration by IEC TC 20 for further standardization in HVDC Field