CIGRE Study Committee B1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP[1]

WG N° B1.66	**Name of Convenor: Gunnar Evenset** (Norway) **E-mail address**: Gunnar.Evenset@Powercc.no
Strategic Directions #[2]: 2	**Technical Issues #[3]: 3,10**
The WG applies to distribution networks[4]: No	
Potential Benefit of WG work #[6]: 2,3,5	
Title of the Group: Recommendations for testing DC Lapped Cable Systems for power transmission at rated voltages up to and including 800kV	

Scope, deliverables and proposed time schedule of the Group:

Background:

The demand for transmission of large amounts of electrical power over long distances has increased the use of DC cables. DC cables with insulation system with lapped paper or polypropylene laminated paper have been used for several decades and these cable systems have proven to have excellent reliability. DC cables with extruded insulation materials were introduced to the market 15-20 years ago and have taken over most of the market for cable systems up to 300-400 kV. The technology for extruded DC cable systems is under constant development and the voltage level for extruded systems is expected to increase in the coming years. However, DC cables with lapped insulation are currently used for the highest voltage levels and will probably still be used for some of the largest transmission links in the coming years, especially long submarine transmission links.

HVDC cable systems with lapped insulation are, in most cases, qualified and tested according to the guidelines from Cigre published in Electra No. 189 in year 2000 – “Recommendations for tests of power transmission DC cables for a rated voltage up to 800 kV”. This recommendation was later supported by the addendum published in Electra 218 in 2005.

The existing test recommendations do not consider the new development in converter technology as they were prepared before voltage source converters became generally available to the market. Voltage source converters are now in operation with lapped cable systems at levels above 500kV and there is a need to review the test recommendations in light of the new developments. The recommendations in Electra No. 189 and 218 should also be combined into an updated technical brochure to make the content easily available to target groups.

It is therefore proposed to establish a working group to review the existing test recommendation, including the addendum, for lapped HVDC cables up to 800 kV. The work will be performed in parallel to WG B1.62, which will prepare an extension of the test recommendations for solid insulated cable systems up to 800 kV, in order to harmonize test requirements if applicable.

The updated technical brochure will assist target groups with guidelines to qualify and test lapped DC cable systems.

Scope:

Test recommendations for lapped cable systems for the voltage class up to and including 800 kV.

The WG will cover:

1. Review of definitions
2. Review of references
3. Review of existing test requirements in Electra No 189/218.
4. Consideration of the introduction of test requirements for operation of lapped DC cables with voltage source converters
5. Combining the test requirements from Electra No. 189/218 and any new requirements from the work into a technical brochure

The WG may benefit from collaboration with WG B1.62, JWG B4/C1.65 and JWG B4/B1/C4.73.

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☐ Electra report

☒ Tutorial[5]

Time Schedule: start: March 2018 **Final Report**: January 2021

Approval by Technical Committee Chairman:

Date: 01/03/2018

Notes: [1] or Joint Working Group (JWG), [2] See attached Table 2, [3]See attached Table 1, [4] Delete as appropriate, [5] Presentation of the work done by the WG, [6] See attached table 3

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (ref. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit