CIGRE Study Committees B1/C4

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

JWG B1/C4.69	**Name of Convenor:** Thinus du Plessis (South Africa) **E-mail address**: duplestp@gmail.com
Strategic Directions #[2]: 1 & 2	**Technical Issues #[3]: 6, 8 & 9**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 3, 5 & 6	
Title of the Group: Recommendations for the insulation coordination on AC cable systems	

Background:

Insulation co-ordination is required for insulated AC cable systems as part of planning studies, system impact studies, equipment design studies, for design and specification verification, and for testing the insulation systems.

CIGRE TB 189 - INSULATION CO-ORDINATION FOR HV AC UNDERGROUND CABLE SYSTEMS scope of works was only performed for underground cable systems, rated at 110kV and above; and for the primary cable insulation. Although at the time the scope of work excluded insulation co-ordination for sheath bonding system, etc. various recommendations were made for a future revision update of TB 189.

A recent, thorough review of TB 189 concluded that a revision update of TB 189 will be required.

Scope of works:

The joint working groups will take forward a revision update of TB 189 and shall include the following cable systems, installation types and parameters:

- AC cable systems
- Solid di-electric and self-contained fluid filled cable systems
- HV and EHV cable systems
- MV cable systems, where insulation co-ordination studies may be applicable and guidance is required
- Buried - suspended in air - and submarine installations
- All over voltages as defined by IEC 60071-1
- Various network configurations (TB 189 clause 7.7) (e.g. transformer to cable; overhead line to cable; GIS to cable to GIS; syphon; capacitors to cable; etc.)

The revision update scope of work for these cable systems, installation types and parameters shall then be:

1) To define the various cable system insulation layers in addition to the primary insulation.

2) For modelling techniques
   - Evaluate TB 556 for the Modelling Techniques of the primary insulation (TB189 clause 7.3) and expand this for any other insulation parts (e.g. sheath bonding system, etc.) of the cable system.

- Investigate the influence of specially bonded cable systems on transient over voltages of the primary insulation (TB 189 clause 7.8) and expand this for any other insulation parts (e.g. sheath bonding system, etc.) of the cable system.
- Consider all cable system installation lengths (e.g. short or long cable systems).
- Consider the position of primary surge arresters.

3) Testing protocols
   - Review type tests and additional test requirements for the cable system and cable system components (TB 189 clause 7.4).
   - Consider the WG B1.50 and other related WG or TB outputs.

4) Insulation co-ordination of all insulation systems other than the primary insulation
   - Review of Sheath Voltage Limiter (SVL) or alternative protection and connection methods.
   - Reviews of equipment insulation withstand levels.
   - Review of over voltage shielding mitigation methods (e.g. counterpoise conductors, etc.).
   - Review all applicable TB's, papers and other literature.

5) Measurement results from lab or site tests
   - For the verification of modelling techniques.

6) Lifetime considerations
   - Ageing effects for the installation (TB 189 clause 7.5).
   - Review of the effect of multiple or regular switching events.

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial

Time Schedule: start: November 2018 Final Report: June 2021

Approval by Technical Committee Chairman:

Date: November 24th, 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