

CIGRE Study Committee D1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP ⁽¹⁾

WG* N° D1.56	Name of Convenor : Volker Hinrichsen (DE) E-mail address: hinrichsen@hst.tu-darmstadt.de	
Technical Issues # ⁽²⁾: 3		Strategic Directions # ⁽³⁾: 1
The WG applies to distribution networks ⁽⁴⁾: Yes		
Title of the Group: Field grading in electrical insulation systems		
Scope, deliverables and proposed time schedule of the Group :		
Background :		
<p>HV equipment like bushings and cable accessories require field grading measures to control and linearize the electrical field in the material and at the interfaces of the insulation. Different approaches provide geometrical grading (conductive layers in the insulation material), refractive grading (high permittivity layers in the insulation), resistive grading (semi conductive layers on the surface of insulation) or combinations of them. Linear or non-linear semi conductive materials like carbon black or silicon carbide (SiC) are used as fillers for the purpose of field grading. Increasing system voltages and requirements are coming up. Direct voltage applications with mixed capacitive and resistive field stress require special considerations. New materials like micro-varistors open new possibilities for the design of bushings, cable accessories etc., but also for electrical insulation systems in other equipment like long rod insulators and rotating machines.</p>		
Scope :		
The topics to be studied by the WG are:		
<ol style="list-style-type: none"> 1. Established field grading technologies in electrical equipment 2. Experience with different materials, designs and applications 3. Characterisation of field grading materials (electrical properties, aging performance, performance under the combined thermal and electrostatic effects, etc.) 4. Emerging technologies (e.g. micro varistors) 5. Simulation techniques for electric field distribution 6. Application examples of new technologies. 		
Experts from equipment and subsystem committees are welcome to join the group.		
Deliverables : Report to be published in Electra or technical brochure with summary in Electra		
Time Schedule : start : September 2013		Final report : 2016
Comments from Chairmen of SCs concerned : A1, A2, A3, B1, B2, B3, B4		
Approval by Technical Committee Chairman : Date : 17/03/2013		

(1) Joint Working Group (JWG) – (2) See attached table 1 – (3) See attached table 2 – (4) Delete as appropriate

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 within distribution level and to the upstream network.
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 (cf. 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