

## CIGRE Study Committee D1

### PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

<b>JWG <sup>1</sup>N° D1/A2.77</b>	<b>Name of Convenor:</b> Orlando Girlanda (SE) <b>E-mail address:</b> orlando.girlanda@hitachienergy.com
<b>Strategic Directions #<sup>2</sup>: 1</b>	<b>Sustainable Development Goal #<sup>3</sup>: 9</b>
<b>The WG applies to distribution networks:</b> <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	
<b>Potential Benefit of WG work #<sup>4</sup> : 3</b>	
<b>Title of the Group: Improved understanding of dynamic behaviour of winding insulating materials in liquid insulated power transformers</b>	
<p><b>Scope, deliverables and proposed time schedule of the WG:</b></p> <p><b>Background:</b></p> <p>Materials and parts in power transformers are specified to withstand the various mechanical stresses that may occur in service (e.g. processing, transportation, earthquakes, short circuit, thermal expansion, winding compression, etc.).</p> <p>When it comes to withstanding short circuits, it is paramount for the materials in a transformer to be able to retain clamping forces over time during service. However, polymeric-based insulation materials are subjected to relatively high temperatures and continuous mechanical load over extended periods of time. These conditions tend to alter the mechanical behaviour of the materials, potentially affecting the short-circuit strength of a transformer.</p> <p><b>Purpose/Objective/Benefit of this work:</b></p> <p>Brief summary of the key outcomes from this work.</p> <p>The brochure should give the tools to test and model the materials that are most relevant to the forecast of the dynamic behaviour of transformer windings.</p> <p><b>Scope:</b></p> <p>The scope of the working group is to study the transformer material-related questions under dynamic loading conditions:</p> <ul style="list-style-type: none"> <li>• Review of the visco-elastic and visco-plastic properties of materials crucial to describe the deformations in transformer windings</li> <li>• Review of dynamic properties of insulation materials</li> <li>• Potential improvement of the testing method for verification of material suitability</li> <li>• Compression testing of solid insulation (paper &amp; pressboard) with conductor-like geometry</li> <li>• Review modelling methods for describing dynamic loading conditions</li> <li>• Suggest possible standardisation</li> <li>• Suggest improved calculation methods</li> </ul> <p><b>Remarks:</b></p> <p>Cigre Brochure 209 "Short circuit performance of transformers" gives a good description of these conditions.</p> <p>WG D1.65 studied the mechanical properties of insulation materials based on the requirements in power transformers, proposed enhanced testing and simulation methods. Interesting findings towards the performance of a power transformer include for example</p>	

dynamic compression testing of materials used for winding spacers and the temperature dependence of insulation materials.

**Deliverables:**

- Annual Progress and Activity Report to Study Committee
- Technical Brochure and Executive Summary in Electra
- Electra Report
- Future Connections
- CIGRE Science & Engineering (CSE) Journal
- Tutorial
- Webinar

**Time Schedule:**

- |   |         |
|---|---------|
| • Recruit members (National Committees) | Q2 2023 |
| • Develop final work plan               | Q4 2023 |
| • Draft TB for Study Committee Review   | Q4 2026 |
| • Final TB                              | Q4 2027 |
| • Tutorial                              | Q2 2028 |
| • Webinar                               | Q4 2028 |

**Approval by Technical Council Chairman:**

**Date:** February 10<sup>th</sup> 2023



**Notes:**

<sup>1</sup> Working Group (WG) or Joint WG (JWG),

<sup>2</sup> See attached Table 1,

<sup>3</sup> See attached Table 2 and CIGRE reference Paper: Sustainability – at the heart of CIGRE's work.

<sup>4</sup> See attached Table 3

WG Membership: refer Comments at end of document

**Table 1: Strategic directions of the Technical Council**

1	The electrical power system of the future reinforcing the End-to-End nature of CIGRE: respond to speed of changes in the industry by preparing and disseminating state-of-the-art technological advances
2	Making the best use of the existing systems
3	Focus on the environment and sustainability (in case the WG shows a direct contribution to at least one SDG)
4	Preparation of material readable for non-technical audience

**Table 2: Environmental requirements and sustainable development goals**

	CIGRE selected the 7 SDGs that are the most relevant to CIGRE. In case the WG work refers to other SDGs or do not address any specific SDG, it will be quoted 0.
0	Other SDGs or not applied
7	<b>SDG 7: Affordable and clean energy</b> Increase share of renewable energy; e.g. expand infrastructure for supplying sustainable energy services; ensure universal access to affordable, reliable, and modern energy services; energy efficiency; facilitate access to clean energy research and technology
9	<b>SDG 9: Industry, innovation and infrastructure</b> Facilitate sustainable infrastructure development; facilitate technological and technical support
11	<b>SDG 11: Sustainable cities and communities</b> Increase attention on sustainable and resilient buildings utilizing local (raw) materials, power for electric vehicles, strengthening long-line transmission and distribution systems to import necessary power to cities, developing micro-grids to reinforce the sustainable nature of cities; protect and safeguard the world's cultural and natural heritage; reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and waste management
12	<b>SDG 12: Responsible consumption and production</b> E.g. Promote public procurement practices that are sustainable; address reducing use of SF6 and promote alternatives, encourage companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle, address inefficient fossil-fuel subsidies that encourage wasteful consumption
13	<b>SDG 13: Climate action</b> E.g. Increase share of renewable or other CO <sub>2</sub> -free energy; energy efficiency; expand infrastructure for supplying sustainable energy; strengthen resilience and adaptive capacity to climate-related hazards and natural disasters; integrate climate change measures into national policies, strategies and planning; improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
14	<b>SDG 14: Life below water</b> E.g. Effects of offshore windfarms; effects of submarine cables on sea-life
15	<b>SDG 15: Life on land</b> E.g. Attention for vegetation management; bird collisions; integration of substations and lines into the landscape

**Table 3: Potential benefit of work**

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

**Comments:**

**1) CIGRE Official Study Committee Rules: WG Membership**

<https://www.cigre.org/GB/about/official-documents>

- a. Only one member per country (by exception of SC Chair)
- b. WG nominees must first be supported by their National Committee (or local SC Member) as an appropriate representative of their country.
- c. Acceptance of the nomination is granted by the SC Chair and advised to the WG Convener

**2) Collaboration Space**

<https://www.cigre.org/article/GB/collaborative-tools-2>

CIGRE will provision the WG with a dedicated Knowledge Management System Space.

The WG will use the KMS for drafting collaboration, capture and retention of discussion and meeting records.

Official country WG Members will be sent registration instructions by the Convener.

Official country WG Members may request the WG Convener to allow additional access for an extra national subject matter specialist to aid in the work at the national level, including NGN members.