

CIGRE Study committee B1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG B1.99

NAME OF THE CONVENOR

Wald Detlef (SWITZERLAND)

TITLE

Evaluation of sustainable power cables system and their installation

THE WG APPLIES TO DISTRIBUTION NETWORKS: YES

ENERGY TRANSITION

4 / Sustainability and Climate Change

POTENTIAL BENEFIT OF WG WORK

5 / Guide or survey on techniques, or updates on past work or brochures

7 / Addressing environmental requirements & sustainable dev. goals

STRATEGIC DIRECTION

3 / Focus of the environment and sustainability (in case the WG shows a direct contribution to at least one SDG)

SUSTAINABLE DEVELOPMENT GOAL

0 / Other SDGs or not applied

BACKGROUND :

The sustainability of power cables and power cable systems has become increasingly significant due to rising demand. Over 100 papers and numerous conferences have addressed this topic, and public awareness regarding sustainability is growing. While many papers and technical bulletins address similar topics, no specific literature delves deeply into the *Evaluation of sustainable power cable systems and their installation* other than TB 689. Although TB 689 covers many areas, a new or revised TB could include more focused evaluations. Additionally, CIGRE brochure TB 689, titled *Life Cycle Assessment of Underground Cables*, has not been mentioned in any recent presentations.

More and more utilities are emphasizing LCA analysis and carbon footprint evaluations due to federal net zero targets, making independent literature from organizations like CIGRE crucial. New developments in materials and manufacturing will be explored, providing experts with knowledge on recycling cable insulation compounds rather than relying solely on manufacturer-provided information.

In recent years, new materials have been introduced in the power cable market claiming higher sustainability compared to existing ones. There has been a noticeable transition from paper-insulated power cables to extruded power cables. Moreover, a shift from copper to aluminium as conductor material is observed, impacting sustainability. Additionally, in Europe, the replacement of lead with other materials is underway. A thorough evaluation of how these changes affect the sustainability of power cables and power cable systems is essential. The EN 50397 standard, published recently, offers fresh approaches. References to other standards will also be useful (IEC).

Several other technical brochures from various working groups are frequently referenced. Numerous working groups outside CIGRE are examining this subject, including private consulting firms. Cenelec and ICC have initiated an ad hoc group, and France and Germany have embarked on related projects. Without careful coordination, a multitude of different recommendations or standards for assessing environmental aspects could emerge.

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :

To do justice to these numerous developments and innovations in the field of power cables, take a holistic view on the environmental impact of power cables, and provide application-oriented and user-friendly guidelines, TB 689 needs an update.

Key objectives and benefits include:

- **Update and expand scope:** Include installation aspects and assess environmental impacts such as biodiversity, linking to TF B1.99 and SDG14/SDG15 processes.
- **Incorporate new materials and methods:** Explore alternative and bio-based materials using mass-balance approaches.
- **Update recycling impact assessments:** Reflect recent advancements and provide standardized perspectives on sustainability actions.
- **Comprehensive lifecycle coverage:** Address raw materials, production, transport, installation, operation, and end-of-life treatment, including removal and material recovery.
- **Risk and performance considerations:** Discuss potential drawbacks, lifetime extension, and minimizing operational losses to create a full evolving model.
- **Alignment with standards and coordination:** Reference Cenelec updates and ensure consistency to avoid fragmented recommendations.

By incorporating these elements, the updated brochure aims to provide a detailed, application-oriented update aligned with the latest developments and innovations, ensuring a common view on actions that make power cable systems sustainable.

The work will also need experts from SC C3 and contact to Cired to have the full picture.

SCOPE :

- 1 Coverage of the Proposed WG (Cable System)
 - 1.1 Voltage (MV-EHV) shielded designs 3 KV to 800 kV
 - 1.2 AC and DC Systems – cables, accessories, ancillaries, and hydraulic equipment.
 - 1.3 All extruded Land and Subsea cable designs
- 2 Literature Review
 - 2.1 Definition of sustainability
 - 2.2 Existing Standards and Regulations
- 3 Evaluate the impact on sustainability and the environment of cables system installations. This should include:
 - 3.1 Raw materials and their production
 - 3.2 Production of cables (including design for easily separation and recycling of materials)
 - 3.3 Production of accessories (including design for easily separation and recycling of materials)
 - 3.4 Production of cable ancillaries and hydraulic equipment
 - 3.5 Transport of power cables
 - 3.6 Installation and laying of cable systems
 - 3.6.1 Here they should also look into the faults rate of different installations TF B1.99 (like for example WG B1.89 – Cable System Failure Analysis or from the RAG)
 - 3.6.2 Here we should also consider installation methods, and all materials used in various installation setups. Civil works, including ducts/conduits, backfilling material, concrete pits and joint bays, Civil works often among the costliest component of our cable laying projects (UG). There may be a different set for Sea cables
 - 3.7 Operation of cable systems
- 4 End of life of cable systems (including removal and materials treatment)

DELIVERABLES AND EVENTS

Deliverables Types

Annual progress and activity report to Study Committee
Technical Brochure and Executive Summary in Electra
Tutorial
Work Schedule

Time schedule

- | | | |
|----|------|--------------------------|
| Q4 | 2025 | Recruit members |
| Q1 | 2026 | Develop workplan |
| Q4 | 2027 | Draft TB for SC review |
| Q4 | 2028 | Final TB for publication |

Q4

2028

Approved Tutorial

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:

Rannveig S. J. Loken

November 24th, 2025