CIGRE Study Committee B2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG B2.94	**Name of Convenor:** Baptiste GARY (France) **E-mail address**: baptiste.gary@epsilon-composite.com
Strategic Directions #[2]: 1,2	**Sustainable Development Goal #[3]: 7, 9, 12, 15**

This Working Group addresses these Energy Transition topics:

- ☐ **Storage**
- ☐ **Hydrogen**
- ☐ **Digitalization**
- ☐ **Sustainability and Climate Change**
- ■ **Grids and Flexibility**
- ☐ **Solar PV and Wind**
- ☐ **Consumers, Prosumers and Electrical Vehicles**
- ☐ **Sector Integration**
- ☐ **None of them**

Potential Benefit of WG work #[4] : 3, 4, 5, 6

Title of the Group:
Inspection after installation, maintenance and end of life of high temperature conductors and fittings

Scope, deliverables and proposed time schedule of the WG:

Background:

Technical brochure 695 defined different categories of HTLS (High Temperature Low Sag) conductors based on the material used for core and aluminium wires:

Type 0: all the conductor limited to 95°C, considered as conventional (ACSR, AAAC, AAC, ACAR, etc…)

Type 1: conductors with steel core and thermal aluminium (Gap, INVAR, TACSR, etc…)

Type 2: conductors with steel core and annealed aluminium (ACSS)

Type 3: conductors with MMC (Metal Matrix Composite) core and thermal aluminium

Type 4: conductors with PMC (Polymer Matrix Composite) core and thermal or annealed aluminium

WG B2.66 works on the safe installation of HTLS conductors & fittings; WG B2.68 has been working on the sustainability of type 0 conductors and fittings.

As the first installation of different HTLS conductor types 1 and 2 date from about 50 years ago, and type 3 and 4 from about 20 years, it is time to think about their long-term reliability and assessment together with their fittings.

Different suppliers and TSO work together on post installation control systems to assess the integrity of the core (for type 3 and 4).

From TSO and producer viewpoint, there is a need to know how to assess the condition and sustainability of the conductor/fitting system and how to repair them if needed.

Also, asset managers need to be able to estimate the end of life of their HTLS conductor/fitting system (mainly dead end, midspan joints, and suspension clamps) based on a method assessed by test results and consensus from the industry.

Six working groups (see end of this TOR for related WG/TB) have worked on HTLS conductors/fittings properties, qualifications, vibration modelling, installations and use for line uprating and new lines.

Purpose/Objective/Benefit of this work:

The key outcomes from this work will be to give the state of the art regarding the post installation checking systems and maintenance recommendations to the industry based on the operating experience worldwide with the different types of HTLS and future needs from TSO's. It will emphasise only on the specificity of HTLS solutions and not describe ageing phenomenon on type 0 conventional solutions (Covered in B2.68).

It will also give recommendations about inspection (type, tools, and intervals), damage classification, and countermeasures to reduce damage and repair of HTLS conductors and fittings.

Finally, it will give methodologies to estimate and compare expected life expectancy for the different HTLS conductors and fittings based on the amperage and operating conditions (highly utilised/ medium utilisation/periodically utilised with stop/starts), localization (which types of environments, rural, marine, industrial, river crossing).

Scope:

The working group will investigate and report on:

1. Identify and propose recommendations of different post installation control systems available currently for HTLS conductors (Types 1 to 4) & fittings indicating their assets and limits.
2. Review and develop the different inspection (destructive and non-destructive) and damage classifications of HTLS conductors (Types 1 to 4 on the core and aluminium wires) & fittings linked to their impact risk on operation.
3. Make some recommendations about repair methods based on the damages (type of tool, periodicity, extension of lifetime, criticality and longevity of repair or more…) and recommendations about necessary fittings and conductors' storage.
4. Make recommendations about ageing models to estimate end of life based on operational criteria (link with number of operating hours, peak temperature reached…) and ageing tests.

Remarks:

Identify previous or related activity (Technical Brochure, Green Book, Working Groups).

TB 426 – Guide for qualifying high temperature conductors for use on overhead transmission lines

TB 695 – Experience with the mechanical performance of non-conventional conductors

TB 763 – Conductors for the uprating of existing overhead lines

TB 828 - Vibration modelling of HTLS

TB 905 – Sustainability of overhead line conductors and fittings – Conductor condition assessment and life extension. Volume 1: State of the art

TB 708 -Guide on repair of conductors and conductor- fitting systems

WGB2.66 – Safe handling and installation guide for high temperature low sag HTLS conductors

WG B2.78 - Use of High Temperature Conductors in New Overhead Line Design

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, WiE, NGN)	Q1-Q2 2024
• Develop final work plan	Q3-Q4 2024
• Draft TB for Study Committee Review	Q4 2025
• Final TB	Q4 2026
• Tutorial	Q2 2027
• Webinar	Q2 2027

Approval by Technical Council Chair:

Date: April 19th, 2024

Notes:
[1] Working Group (WG) or Joint WG (JWG),
[2] See attached Table 1,
[3]See attached Table 2 and CIGRE reference Paper: Sustainability – at the heart of CIGRE's work.
[4] 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	**SDG 7: Affordable and clean energy** 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	**SDG 9: Industry, innovation and infrastructure** Facilitate sustainable infrastructure development; facilitate technological and technical support
11	**SDG 11: Sustainable cities and communities** 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	**SDG 12: Responsible consumption and production** 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	**SDG 13: Climate action** E.g. Increase share of renewable or other CO_2-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	**SDG 14: Life below water** E.g. Effects of offshore windfarms; effects of submarine cables on sea-life
15	**SDG 15: Life on land** E.g. Attention for vegetation management; bird collisions; integration of substations and lines into the landscape

Table 3: Potential benefit of work

1	Commercial, business, social and economic benefits 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 directions
5	Guide or survey related to existing techniques; or an update on past work or previous Technical Brochures
6	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, WiE and NGN nominees.

b. WG nominees by NCs 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.