CIGRE Study committe B2
PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG B2.100

NAME OF THE CONVENOR
Deppa Lisa (UNITED STATES OF AMERICA)

TITLE
Overhead Line High Temperature Conductor Design Tensions Considerations with Respect to Aeolian Vibration

THE WG APPLIES TO DISTRIBUTION NETWORKS: YES

ENERGY TRANSITION
5 / Grids and Flexibility

POTENTIAL BENEFIT OF WG WORK
1 / commercial, business, social, economic benefits
2 / potential interest from a wide range of stakeholders
3 / likely to contribute to new or revised industry standards
6 / work likely to contribute to improve safety

STRATEGIC DIRECTION
2 / Making the best use of the existing systems

SUSTAINABLE DEVELOPMENT GOAL
7 / Affordable and clean energy
9 / Industry, innovation and infrastructure

BACKGROUND :
In 2005, CIGRE Technical Brochure (TB) 273 was issued. This TB outlines the selection of safe design tensions for conventional conductors such as round wire ACSR, using conventional suspension clamps. Other technical brochures such as TB 653 and TB 828 are also available and provided additional insight on key variables such as the impact of Elastomer Cushion Suspension units on safe tensions and the self-damping characteristics of high temperature conductors. These technical brochures provide helpful insights on specific variables for aeolian vibration design, yet a comprehensive recommendation of safe design tensions for high temperature conductors is still lacking in the industry. In recent years, adoption of high temperature conductors has increased in the industry. Industry guidelines for design tension considerations for these types of conductors should be addressed to ensure safe and effective adoption of these wire types.

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :
Provide industry guidance on the selection of safe design tensions for high temperature conductors with respect to aeolian vibration. Such guidance is currently lacking in the industry, and these conductors are being adopted at an increasing rate to enable more capacity on existing transmission lines, facilitating access to renewable energy. Guidance on evaluating design tensions is needed to ensure the tensions being selected for design are safe and effective, allowing for these conductors to achieve the desired lifespan with limited damage from aeolian vibration. To validate safe design tension recommendations, field data is typically required. In this situation, sufficient data may not be available due to the relative newness of these wire types. Therefore, the purpose of this technical brochure is to evaluate the numerous aeolian vibration-related differences of high temperature conductor systems from to traditional conductor systems and discuss how these differences impact the fatigue outcome.

There is a recognized need within the industry to further advance guidance on design tensions for high-temperature conductors. As these conductors are increasingly applied to enhance transmission capacity and

accommodate evolving system requirements, the absence of comprehensive and harmonized design recommendations has become a notable challenge. Addressing this gap would provide tangible benefits to asset owners and system planners by supporting consistent and reliable application of high-temperature conductor technologies.

SCOPE :

The working group will produce a technical brochure and tutorial. The brochure will be focused on high temperature conductors. The conductors considered within this scope will be based on the definitions in CIGRE TB 695, encompassing groups 1 through 4. A survey will be taken as a first step to identify design practices and experiences of utilities from different countries using high temperature conductors.

The following topics will be addressed:

- Identify the fatigue performance of annealed aluminium and high-temperature aluminium alloys in the context of stranded conductors. Explore any available testing data on fatigue performance of non-traditional materials and conductors in the type of suspension clamps recommended for these conductors.
- Distinguish the fretting fatigue performance of trapezoidal stranding from round-wire stranding and discuss the impact on selecting design tensions.
- Discuss the self-damping characteristics of high temperature conductors, considering content in CIGRE Technical Brochure 828. Identify the impact of these characteristics on selecting design tensions.
- Identify the fatigue performance of the core of each conductor type, with special focus on novel core materials such as the metal-matrix composite (MMC) and polymer-matrix composite (PMC) cores.
- Collect data to assess whether the different HTLS conductors exhibit global vibrational modes, or whether disparities in the H/w ratio compared to the modulus-of-elasticity-to-density ratio between the core and the outer strands modify the system’s intrinsic damping characteristics and modal resonance behaviour.
- Discuss the distribution of stress on the core and outer strands, where unique moduli of elasticity of the materials used in high temperature conductors can result in different stress distributions compared to those of traditional conductors.
- Discuss the impact of conductor operating temperature on aeolian vibration and fatigue performance.
- Discussion of damping systems available for high-temperature wires and their impact on design tensions.
- Discussion on the impact of hardware selection for preventing fatigue-related damage for high temperature conductors.
- Discuss catenary tension limits versus percent rated tensile strength (RTS) limits in the context of high-temperature conductors, noting that many of these conductors have a high RTS relative to their size.
- Discuss current design practices and recommendations for assigning design tensions for these conductors. Input would be included from utilities, conductor manufacturers and damper manufacturers and this information would be collected through a survey.

After consideration of the many variables noted above, identify key trends which could impact tension limit recommendations for the various high-temperature wire types and systems.

Evaluate the potential implications of using previously developed industry tension guidelines (e.g. catenary limits in TB 273, historical percent RTS limits) for these wires in the absence of more targeted tension recommendations.

The Working Group will develop engineering guidance for evaluating and selecting design tensions for high-temperature conductors with respect to aeolian vibration. Where sufficient technical evidence exists, recommendations for selecting design tensions will be provided. Where evidence is insufficient, the Working Group will identify knowledge gaps and recommend future research. Galloping, subspan oscillation, and wake-induced oscillation are outside the scope except where they directly influence aeolian vibration design tensions.

Design tensions for Optical Ground Wire (OPGW), round wire Aluminium Conductor Steel Reinforced (ACSR), All Aluminium Conductors (AAC), and All Aluminium Alloy Conductors (AAAC) are not directly considered within the scope of this working group. The focus of this working group will be on high-temperature conductors. However, as the group progresses, opportunities to comment on these other wire types may be included where appropriate.

The schedule recommended for the working group is noted in the section below. The schedule may be shifted according to when the TOR is approved.

Remarks:

Candidates with research studies available on the scope topics noted above will be prioritized for participation in the Working Group. Participation is encouraged from utilities, conductor manufacturers, hardware manufacturers, research institutions, consultants, and universities with demonstrated experience in high-temperature conductor technology, aeolian vibration, fatigue, laboratory testing, numerical modelling, or field performance.

The schedule is longer than typical. This is to allow time for some laboratory exploration to be carried out in parallel with the drafting of the Technical Brochure. The timeframe is expected to be more realistic to allow time for some research to take place on the topic.

DELIVERABLES AND EVENTS

Deliverables Types

Annual progress and activity report to Study Committee

Technical Brochure and Executive Summary in Electra
Tutorial
Webinar

Time schedule

Q4	2026	Recruit members (National Committees, WiE, NGN)
Q1	2027	Develop final work plan
Q2	2028	Questionnaire
Q1	2031	Draft TB for Study Committee Review
Q3	2031	Final TB
Q3	2032	Tutorial
Q3	2032	Webinar

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:
Rannveig Loken
October 13th, 2026