CIGRE Study committe A3

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

JWG A3/B3/D2/IEEE_PES.54

NAME OF THE CONVENOR
Nenning Andreas (AUSTRIA)

TITLE
Global database for circuit breaker testing data

THE WG APPLIES TO DISTRIBUTION NETWORKS: YES

ENERGY TRANSITION
3 / Digitalization

POTENTIAL BENEFIT OF WG WORK
2 / potential interest from a wide range of stakeholders

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

SUSTAINABLE DEVELOPMENT GOAL
9 / Industry, innovation and infrastructure

BACKGROUND :

- TB 167: Provides a general overview of the philosophy and application of monitoring and condition assessment of HV- switchgear.
- TB 462: Provides justification of allocable costs. It also shows that online condition monitoring occupies a central position in a smart grid.
- TB 737: Gives an overview of the available non-intrusive test methods for switchgear. Describes which methods are known and which are used to obtain information about the condition of switchgear.
- WG A3.43: Informs about the interpretation of collected condition assessment data. Shows the relationship between degradation mechanism and condition indicators. Describes the conversion of condition indicators into a switchgear health index.

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :

To optimize the use of available resources, it is essential to assess the condition of switchgear at different stages of its life cycle. Traditionally, a maintenance team visits the switchgear according to a periodic schedule, such as every x years, to evaluate its condition. Based on this assessment, they carry out necessary tasks to guarantee the asset's reliability until the next scheduled service. With the advent of digital substations, this process can change. A service expert using a substation monitoring device can remotely evaluate the asset's condition and determine whether servicing is needed, along with identifying the specific parts requiring attention

Advantage of utilizing digital substation networks

- Your maintenance budget for assets is utilized more effectively
- You avoid onsite visits only to discover the asset is in excellent condition
- You refrain from replacing components that are functioning well, but you anticipate that they may not endure until the next scheduled service
- Unexpected issues with parts wearing out quicker than expected are also prevented.

Current Situation

- Mostly, proprietary solutions employing singular measurement techniques, such as partial discharge measurement are availalbe
- Expensive because of significant integration challenges when evaluating the complete asset, since interfaces do

not follow standardization.

Previous Work Conducted

Earlier Cigrè working groups have established the groundwork for using digital substations in the condition assessment of switchgear. TB 737 presented a summary of existing non-intrusive diagnostic techniques, while TB 959 assists in choosing condition indicators by considering potential failure modes.

List of Cigre Technical Brochures (TB) related to this working group

- TB 167: Provides a general overview of the philosophy and application of monitoring and condition assessment of HV- switchgear.
- TB 462: Provides justification of allocable costs. It also shows that online condition monitoring occupies a central position in a smart grid.
- TB 737: Gives an overview of the available non-intrusive test methods for switchgear. Describes which diagnostic methods are known and which are used to obtain information about the condition of switchgear.
- TB 959: Informs about the interpretation of collected condition assessment data. Shows the relationship between degradation mechanism (Failure Mode) and condition indicators. Describes the conversion of condition indicators into a switchgear health index.

Objective of this work

Flow Information

Figure 1: Flow of information (Adapted from TB 737)

NOTE The picture cannot be shown here belo a text version

Switchgear --> (SensorData / Failure mode) --> Diagnostic Methods --> (Condition Indicators / Assessment Data) -->Assessment --> (Condition)

SCOPE :

The task of this working group involves gathering assessment data crucial for condition assessment and determining the state of MV and HV circuit breakers. To accomplish this, existing user manuals will be gathered, and the assessment data outlined in them will be aligned with condition indicators and diagnostic methods developed from earlier studies. See Figure 1. The result will be a comprehensive description of the essential condition indicators, diagnostic methods, and their correlated limit values.

To achieve this objective, the following tasks must be completed:

1. Clarify the legal constraints regarding the collection and distribution of circuit breaker user manuals
2. Define the essential assessment data required by the diagnostic methods, use Cigre and IEEE technical brochures as well as circuit breaker user manuals for that
3. Establish a procedure for extracting assessment data from the user manuals, suggesting AI as a potential method
4. Offer a comprehensive description of the data interface for condition indicators and assessment data. For this task, using UML is proposed.
5. Suggest a sustainable and automated method to publish the extracted assessment data from user manuals, such as using a GitHub server

Include or not DC circuit breakers.
Although they have the same function of switching on and off nominal and faulty current, DC circuit breakers are a quite different type of asset in comparison to AC ones.
Considering the limited nember of DC circuit breakers in use, extending the scope of the TB to cover them as well, is not in the main scope of this TB.

DELIVERABLES AND EVENTS

Deliverables Types

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

Deliverables schedule

Annual progress and activity report | Q4 | 2025 | Discussion with IEEE for dual logo CIGRE / IEEE

Time schedule

Q4 | 2025 | Discussion with IEEE

Q4 | 2025 | Recruiting

Q1 | 2026 | Kick off meeting

Q4 | 2028 | End of activity

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:
Rannveig S. J. Loken
January 08th, 2026