

CIGRE Study Committee B3

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

| | | |
|---|---|---|
| JWG 1^o B3/A3.60 | Name of Convenor: K.P. (Piet) Knol (Netherlands) | |
| Strategic Directions #²: 2, 3 | | Sustainable Development Goal #³: 12 |
| The WG applies to distribution networks: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No | | |
| Potential Benefit of WG work #⁴: 1, 3, 4 | | |
| Title of the Group: User guide for non-SF ₆ gases and gas mixtures in Substations | | |
| <p>Scope, deliverables and proposed time schedule of the WG:</p> <p>Background:</p> <p>Recent developments show the growth in application of non-SF₆ gases and gas-mixtures in medium voltage (MV) and high voltage (HV) switchgear for insulation and arc quenching. Recently presented alternative gases/ non-SF₆ gases contain components of air (such as N₂ or CO₂) and can contain fluorinated compounds.</p> <p>The main driver is a reduction of potential greenhouse gas emissions during the full life cycle of the switchgear.</p> <p>For users and manufacturers, different aspects are still uncertain. IEC 62271-4 and TB 802 (Application of non-SF₆ gases or mixtures in MV and HV GIS) provides basic information, however, the practical user aspects need to be discussed in more detail. This WG will provide guidance and evaluate and summarize the following items:</p> <p>Scope:</p> <ol style="list-style-type: none"> 1) Handling guide with a focus on achievable filling accuracy and maintainability based on suitable mixing methods and procedures throughout the operational life of the equipment. 2) Gas measurement guide according to TB 723 (SF₆ measurement guide) 3) Tightness guide and requirements <ul style="list-style-type: none"> - Methods for monitoring of gas leakage - Additional leakage effects to be considered for non-SF₆ gases (e.g. permeation, compatibility with CO₂) - Testing methods to prove specified leakage rates with non-SF₆ gases <ol style="list-style-type: none"> i) Long-term tests to evaluate permeation; ii) Effects of temperature, material, gas influence, iii) Type test considerations iv) Factory Acceptance Test & Site Acceptance Test considerations - Methods for on-site leakage testing with non-SF₆ gases - Monitoring <ul style="list-style-type: none"> ▪ Pressure ▪ Partial discharge ▪ Density ▪ others | | |

4) Environmental, health and safety aspects

- Overview of toxicity evaluation methods (e.g. according to REACH, ECHA, etc)
- Impact of toxicity on personnel and operational safety of MV and HV Gas Insulated Switchgear (GIS) and Gas Insulated Line (GIL) containing non-SF6 gases and gas mixtures
- Methods for hazard assessment for MV and HV GIS/GIL containing non-SF6 gases and gas mixtures
- Adequate countermeasures to enhance personnel and operational safety

End-of-life treatment and recycling guide according to TB 234 (SF6 recycling guide)

Deliverables:

- Technical Brochure and Executive Summary in Electra
- Electra Report
- Future Connections
- CSE
- Tutorial
- Webinar

Time Schedule: start: 05 2021

Final Report: 11 2024

Approval by Technical Council Chairman:



Date: April 30th, 2021

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

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. |