



PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP ⁽¹⁾

WG N° B3.45	Name of Convenor: K.P. (Piet) Knol (NL) E-mail address: Piet.knol@alliander.com
Technical Issues # ⁽²⁾: 7	Strategic Directions # ⁽³⁾: 1, 3
The WG applies to distribution networks ⁽⁴⁾: Yes	
Title of the Group: Application of non-SF ₆ gases or gas-mixtures in medium voltage and high voltage gas-insulated switchgear	
Scope, deliverables and proposed time schedule of the Group: Background: Recent developments show the application of non-SF ₆ gases and gas-mixtures in medium voltage and high voltage switchgears for insulation and arc quenching. Recently presented alternatives to SF ₆ contain components of air (such as N ₂ or CO ₂) and can contain fluorinated compounds. One of the main drivers is potential reduction of the global warming effect during the full life cycle of the switchgear. Present IEC standards for switchgear focus on the application of SF ₆ and are therefore not always directly transferable to non-SF ₆ gases or gas-mixtures. IEC 60376 and IEC 60480 provide a guideline on impurities and other technical characteristics for SF ₆ only. The working group shall investigate the needs for adaptations or new requirements to secure the safe, reliable and sustainable application of alternatives to SF ₆ in gas-insulated switchgear. The need for this working group to study application issues is clear due to several pilot projects being already underway. These involve the development and deployment of alternatives to SF ₆ , demonstrating the feasibility of large scale application of alternative gases for insulation. Scope: The scope of this Working Group is to investigate the given and available properties of the non-SF ₆ gases and gas-mixtures and their application in gas insulated switchgear. Furthermore the Working Group will provide recommendations to all stakeholders regarding the impact on the relevant standards. To achieve this goal the Working Group will perform – if necessary – additional studies or if applicable, a survey. The scope includes the following topics: <ol style="list-style-type: none">1. Quality and purity requirements for non-SF₆ gases and gas-mixtures used in substation equipment. IEC 60376 and IEC 60480 provide guidelines on impurities for SF₆ but there is currently a lack of definitions for gaseous, non-SF₆ insulation and switching media.2. Aging aspects for non-SF₆ gases, when applied in gas-insulated switchgear including possible impact on equipment.3. Gas handling: investigate the requirements for gas handling of non-SF₆ gases and gas-mixtures.4. Filling accuracy: Investigate requirements for filling accuracy for gas mixture based	

on individual components.

5. Leakage rate requirements:

The requirements for leakage rates as stated in IEC 62271-203, section 5.15.2 are that closed pressure systems for gas require that any single compartment to atmosphere and between compartments shall not exceed 0.5 % per year for the service lifetime of the equipment.

The leakage rate of the individual components in the gas mixtures can be different. Measurement of some gas components could be difficult. The WG will investigate the requirements for leakage rates.

6. Interlocking requirements:

Alarm levels for gas mixtures containing different gas components with different dielectric strength. Meaningful definitions of the interlocking pressures are required. Present IEC 62271-203 sub clause 5.9 states at present that for GIS only gas density is of importance.

7. Environmental, health and safety aspects in the application of non-SF₆ gases and gas-mixtures.

8. Maintenance and life-cycle aspects including end-of-life considerations/ reuse concepts.

Coordination with Cigré WG D1.51 needs to be secured.

Deliverables: Technical brochure, summary in Electra, Tutorial

Time Schedule: start: mid 2016

Final report: end of 2018

Comments from Chairmen of SCs concerned: D1, A3

Approval by Technical Committee Chairman:

Date: 29/06/2016



⁽¹⁾ or Joint Working Group (JWG) - ⁽²⁾ See attached table 1 – ⁽³⁾ See attached table 2

⁽⁴⁾ Delete as appropriate



Table 1: Technical Issues of the TC project “Network of the Future” (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (cf. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non technical audience