CIGRE Study Committee B2.75

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG N° B2.75	**Name of Convenor: Bruce McLaren** (SOUTH AFRICA)
Technical Issues #[2]:1, 9	**Strategic Directions #[3]: 1,2,3**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[5]: 1, 5, 6	
Title of the Group: Application guide for insulated and un-insulated conductors used on medium and low voltage overhead lines	

Scope, deliverables and proposed time schedule of the WG

Background

Conductors used on overhead distribution systems may utilize insulated (usually bundle), covered or un-insulated conductors made of aluminium or aluminium alloy with or without steel or other materials for the mechanical properties, or they are made of copper. Each option has advantages and disadvantages in principle, e.g. there may be fewer faults using insulated or covered conductors but permanent faults may be more difficult to locate. Bundle conductor networks are more recent that bare conductor networks, so it would in the interests of utilities to understand the experiences of other utilities with respect to which type of network performs better than which and under which conditions. The difference between covered and insulated conductors is that the latter provides full insulation protection while the former does not.

Networks included are low voltage (LV), which is defined as being less than 1000 V a.c., and medium voltage (MV), which is defined as ranging from 1 kV to 45 kV a.c.

Insulated or covered lines are in principle well suited for urban environments because they require smaller way leaves/servitudes and can hence accommodate encroaching buildings to a greater degree than uncovered lines. This may have a cost advantage (again in principle) for existing lines over burying the lines.

In rural areas, changes in the use of servitudes of existing overhead lines using uncovered conductor may necessitate the use of covered conductor to avoid having to obtain a new servitude, or where another servitude cannot be obtained. An example is where relatively low crops are replaced by trees. The result is poorly performing overhead MV lines that may pose a safety risk to the public due to the frequent faults caused by uncovered conductors in close proximity to vegetation.

Consideration of options such as these is becoming increasingly important as obtaining new servitudes becomes more difficult, as available servitudes become smaller and as capital for rebuilding of networks becomes more scarce.

Scope

1. Conduct a literature scan on experiences with insulated, covered and uninsulated conductors.

2. Collate experiences from around the world with respect to experience with these conductors on overhead MV and LV lines by conducting a survey.

3. Compare operational experience and costs of insulated v. covered v. bare conductors in urban and rural environments.

4. Compile a guide to the conditions (technical, safety, environmental and economic) under which the different conductor types are most suitable and when their use is not recommended. The economic analysis will be in the form of a cost analysis, including material, installation and material costs. Addressing theft of copper conductor will also be included.

5. The effect on protection settings, maintenance, public safety, environmental benefits and line performance will also be included.

Deliverables:

☒Technical Brochure and Executive Summary in Electra

☐ Electra Report

☒Tutorial[6]

☐ Webinar[6]

Time Schedule: start: April 2019 **Final Report**: End 2022

Approval by Technical Council Chairman:

Date: March 14th, 2019

Notes: [1] Working Group (WG) or Joint WG (JWG), [2] See attached Table 1, [3]See attached Table 2, [4] Delete as appropriate, [5] See attached Table 3,
[6] Presentation of the work done by the WG

Table 1: Technical Issues for creation of a new WG

1	Active Distribution Networks resulting in bidirectional power and data flows within distribution levels up to higher voltage networks
2	Digitalization of the Electric Power Units (EPU): Real-time data acquisition includes advanced metering, processing large data sets (Big Data), emerging technologies such as Internet of Things (IoT), 3D, virtual and augmented reality, secure and efficient telecommunication network
3	The growth of direct current (DC) and power electronics (PE) at all voltage levels and its impact on power quality, system control, system operation, system security, and standardisation
4	The need for the development and significant installation of energy storage systems, and electric transportation, considering the impact they can have on the power system development, operation and performance
5	New concepts for system operation, control and planning to take account of active customer interactions, and different generation types, and new technology solutions for active and reactive power flow control
6	New concepts for protection to respond to the developing grid and different generation characteristics
7	New concepts in all aspects of power systems to take into account increasing environmental constraints and to address relevant sustainable development goals.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics
9	Increase of right of way capacity through the use of overhead, underground and submarine infrastructure, and its consequence on the technical performance and reliability of the network
10	An increasing need for keeping Stakeholders and Regulators aware of the technical and commercial consequences and keeping them engaged during the development of their future network

Table 2: Strategic directions of the Technical Council

1	The electrical power system of the future: respond to speed of changes in the industry
2	Making the best use of the existing systems
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

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.
7	Work addressing environmental requirements and sustainable development goals.