CIGRE Study Committee B1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG [1]N° B1. 82	**Name of Convenor:** Paul Knapp (US) **E-mail address**: Paulknapp82@gmail.com
Strategic Directions #[2]: 1 & 3	**Sustainable Development Goal #[3]: 7,9 &13**
The WG applies to distribution networks: ☒ Yes / ☐ No	
Potential Benefit of WG work #[4] : 2, 3 & 4	
Title of the Group: MVDC Cable System Requirements	

Scope, deliverables and proposed time schedule of the WG:

Background:

Due to the rapid development of distributed renewable energy resources (DERs), the fast growth of DC power & DC loads (such as PV, wind turbines, EVs and Data Center's) is anticipated.

Medium voltage direct current (MVDC) grids have attracted global attention.

In contrast, current HVDC cable standards have been established for large scale Transmission projects with an approach to encompass the most reliable but time demanding tests (e.g. PQ test).

According to national experiences and collected feedbacks, MVDC power cable applications today are minimal and handled on an "ad-hoc" basis adapting from either Medium Voltage Alternating Current (MVAC) standards and materials, or High Voltage Direct Current (HVDC) standards and materials. In the future, MVDC applications are expected to grow significantly (cf. CIGRE TB 793) (CIGRE WG C6/B4.37), in parallel and independently from HVDC applications and MVAC applications.

As such development occurs, it will be necessary to establish a common, trans-industry approach dedicated to ensuring MVDC cable technology offers the same performance, interoperability and reliability guarantees as experienced in other cable applications.

To that effect, it will require that such guarantees are adapted to be in line with the specific requirements of MVDC, which are different from MVAC, e.g. interdependency of conductivity with temperature and field strength; potential risk of space charge accumulation, but lower field strength leading to lower impact of conductivity, meaning potentially less stringent testing requirements than for HVDC cables.

In recent WG B1.62, a boundary has been established (20 kV/mm average field) between HVDC cables and EHVDC cables. Similarly, a limit could be determined to define MVDC cables (nominal voltage or electric field stress, to be defined), where such adapted testing requirements would be applicable.

Scope:

The WG will explore and attempt to cover the following items:

1. Existing experiences and applications for MVDC cables
2. System Requirements
    a) Losses & Efficiency to be determined by cost, voltage drop and/or CO2 emissions

b) Operation Conditions, cable ratings, overload capacity, fault current and durations, wet/dry installations
c) Fault clearance strategies – single disconnect, reclose strategy, system fault in converter and other constraints in line with JWG C6/B4-37.

3. Recommendation of boundary of HV/MV & AC/DC material (where and when DC-specific solution material/ accessories become relevant/required)
4. Review of existing HVDC & MVAC cable standard(s) for recommendation to MVDC cable system
5. Operations & Maintenance

Deliverables:

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

Time Schedule: start: Q1/2022 **Final Report**: Q4/2024

Approval by Technical Council Chairman:

Date: October 17th, 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.