

DISCUSSION MEETING SUMMARY

Study Committee **B 1** (Insulated cables)

Date of your Group Discussion Meeting 29.08.2024

Chair: Geir Clasen (NO)

Secretary: Matthieu Cabau (FR)

Special Reporters: Alexandra BURGOS MELGUIZO (Leader)
Florian AINHORN
Jacco SMIT
Søren KRÜGER OLSEN
Ivan JOVANOVIĆ

1. INTRODUCTION

The 2024 discussion meeting of Study Committee B1 was held on 29th August in room Bleu at the Palais des Congrès in a full day session. The session were only face to face as the audience was lively with questions.

The following Preferential Subjects were discussed:

- PS1: Learning from experiences
 - PS 2: Future functionalities and applications
 - PS 3: Towards sustainability
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- PS1 attracted 56 papers, 6 questions in the Special Report, 47 contributions which was followed up by 9 questions from the audience.
 - PS2 attracted 20 papers, 6 questions in the Special Report, 15 contributions which was followed up by 7 questions from the audience.
 - PS3 attracted 9 papers, 9 questions in the Special Report, 5 contributions which was followed up by 4 questions from the audience.

2. RUNNING OF THE MEETING

The Discussion Group Meeting was chaired by the Study Committee Chair, Geir Clasen and the Special Reporter Team, Florian AINHORN, Jacco SMIT, Søren KRÜGER OLSEN, Alexandra BURGOS MELGUIZO, Ivan JOVANOVIĆ in addition B1 Secretary Matthieu Cabau.

The morning session started with a summary by the SC Chair of the scope of the work of SC B1. The chair also provided a quick summary of the procedure for running the GDM. The chair then introduced the special reporters and the preferential subjects and indicated that the special reporters would provide a brief discussion of each preferential subject prior to the contributor presentations.

In addition to the Prepared contribution to the Special Report, three additional presentations were given.

First was the conclusions from the bi-annual report from Reliability Advisory Group with cable failure statistics (ID: 11258). There were also two presentations from NGN members-

ID: 11892 – Comparative Study on Detection Methods for Buffer Layer Defects in High voltage XLPE cable with corrugated aluminum sheath.

ID: 11886 – Harnessing solar-wind complementary to unlock the full potential of submarine high-voltage cables.

3. CONTRIBUTIONS TO PREFERENTIAL SUBJECT 1

PS1 – Learning from experiences

- Design, manufacturing, installation techniques, maintenance and operation
- Quality, monitoring, condition assessment, diagnostic testing, fault location
- Lessons learned from permitting, consent and safety issues from design to implementation

Congested areas make upgrades or replacement of cables increasingly, pulling cables into fluid-filled cable ducts are one solution used, some coastal areas are using submarine cables to avoid such congested cities other methods are Super Conducting cables, BIM planning and Horizontal Drilling.

Load prediction and integrated temperature systems are getting important to maximise energy loading of cables. Also control of soil composition has been under focus.

Several methods for quality control are being employed, Partial Discharge with innovative sensors/data gathering, withstand testing with modular Near Frequency AC systems and laser scanning techniques.

The grid operation has changes significantly and there is concern that this might accelerate cable system failures.

Focus on dynamical cables, wet design insulation and replacement of lead as water barrier is drawing much research work that was presented and discussed.

4. CONTRIBUTIONS TO PREFERENTIAL SUBJECT 2

PS2 - Future functionalities and applications

- Innovative cables and systems, exploring the limits of both land and submarine cables,
- Role and requirements of power cables in tomorrow's grids,
- Prospective impacts from the Internet of Things, Big Data and Industry 4.0 and Robotics on power cable systems.

Loading of cables from renewable energy resources has challenges as the load varies over the day and may not use the cable effectively. Integrating several renewable energy resources may be a solution. Or allowing higher temperatures. Methods for cable ratings calculations (FEM etc) are now available but must be checked for its accuracy.

New test methods has been introduced, but experience are still sparse. It is important to make qualified decisions on the verification process for cable systems and not only go for "all in".

5. CONTRIBUTIONS TO PREFERENTIAL SUBJECT 3

PS 3: Towards sustainability

- Experience with technical sides of environmental challenges for current and future cable systems,

- Technical impacts of recycling, roadmap to net zero, Life-cycle of system with upgrading and uprating, inclusion of new technologies such as Hydrogen
- Projects and initiatives to promote access to affordable, reliable, sustainable distribution and transmission cable systems for all

A large portion of the underground cable grid are still using Fluid Filled cables in ducts, such as High Pressure Fluid filled solutions. Replacement strategies that have less environmental and public disturbance impact are being employed. This will often involve in pulling AC cables in old ducts.

Life cycle certification of cable systems are not in place, however some analysis are being done. It must cover all process, such as raw material, production process, installation, losses and removal at end-of-life.

Digital Twins are being developed to optimise the cable load without damaging the cable system. This will reduce Life Cycle Cost by XXXXXX

6. CONCLUSION

The running of the GDM was a pleasure with an active audience.

The crew at Palais de Congrès were able to help with a smooth operation. A special thank to the timekeeper (big Dutch guy with a bell) that ensured that we finished with 4 minutes to spare.

One note is that the time for discussion is rather short with more than 50 prepared contributions. It should be considered to reduce the number of contribution (based on relevance and quality).