



DISCUSSION MEETING

SUMMARY

Group B1

(Insulated Cables)

Thursday 26th August 2010

Chairman: F. RÜTER (SWEDEN)

Secretary: Y. MAUGAIN (FRANCE)

Special Reporter: P. ARGAUT (FRANCE)

The Chairman opened the meeting with a presentation of the present state of the Study Committee, addressing the actual fields of activities and the trends in the field of insulated cables.

The Special Reporter then made a short introduction of the Special Report, which was based on 27 published papers submitted within Study Committee B1 to three Preferential Subjects earlier this year (28 abstracts had been accepted but one paper has been cancelled).

Based on these 27 papers the Special Reporter had prepared the Special Report with 13 questions, which for the Group Discussion Meeting had attracted 49 prepared contributions.

3 invited contributions were also presented.

61 spontaneous contributions were made during the meeting.

Around 300 people attended the meeting during both morning session and afternoon session with peaks at 350 and never under 250.

Preferential Subject No.1: Technical challenges that have been overcome in newly installed underground and submarine cable systems

- Current state-of-the-art in the design of AC and DC submarine and underground traditional cable systems
- Current state of the art in cable systems installation techniques.
- Experiences of operation of cable systems

This subject had attracted 17 papers for the Special Report, and 23 prepared contributions for the Group Discussion Meeting.

The first question addressed the availability of HVAC solutions for long distance transmission versus power/voltage/length. Four prepared contributions offered some elements to better understand the issues. The invited contribution “Technical (electrical) issues regarding the integration of a long distance underground or submarine cable in the network” gave a widened view of the challenges. Five spontaneous contributions completed the discussion. High performance backfilling materials were also discussed.

The second question aimed to understand the current state of the art for HVDC extruded cable systems and to identify the trends. Seven prepared contributions were presented opening a discussion with nine spontaneous contributions. Cable conductor temperature in operation was discussed. The trend is definitely towards higher voltages (500 kV in operation in a few years), bigger powers to transmit and increasing lengths.

Global behaviour of large cable systems installed in tunnels was the topic of the third question, especially when cable systems connect a large generator to the network. The discussion was opened by five prepared contributions which were followed by five spontaneous ones. Different issues were listed showing that additional work could be needed. Earlier in the week, the SCB1 had decided to investigate in this area.

Question four addressing the areas to be explored to better optimize the sizing and the cost of submarine and land cables was the subject of four prepared contributions regarding mainly the use of finite elements calculations and comparison with tests to better estimate the losses. Some different opinions were expressed.

Further work is expected in this area.

Question five was dedicated to HTSC cable systems and to an update of the lessons from installed HTSC cable systems, including pilot ones. Three prepared contributions gave the information regarding main installed (short) cable systems, with up to four years experience. Six spontaneous contributions completed the discussion. Increased test lengths will be installed soon.

At the end of the morning session, SC D1 gave a short overview about the status of nanocomposites and the possibility to use them in insulated cables. This presentation was very well received by the audience.

Preferential Subject No.2 : Key factors in current and foreseen development of cable systems

- Environmental impact
- Balancing capital costs (including costs for Right of Ways) vs operational costs (including costs for operation and maintenance, social costs, losses, dismantling, etc.)
- Prospects of UHV cable systems

This subject had attracted 4 papers for the Special Report, and 12 prepared contributions for the Group Discussion Meeting.

Question 1 dealt with environmental impact of cable system during the whole service life and aimed to list the existing studies made in the area. Only one prepared contribution was presented followed by one spontaneous contribution. Life Cycle Analysis is under consideration within SC B1 for a possible new WG.

Question 2 regarding the “events” and faults in underground lines was addressed by four prepared contributions. Third party damage is a concern. The use of radial barrier is recommended. Short-circuit levels are an important criterium for the consequences of fault.

Upgrading existing lines is a solution which is more and more adopted by utilities. It can be the solution of minimum impact on environment. Question three aiming to hear about experiences in upgrading existing lines and process of decision making received four prepared contributions opening a discussion among nine spontaneous contributions. The necessity of preliminary studies and tests before decision was discussed.

Question four aimed to understand the new considerations between AC and DC transmission lines in terms of System/Network design and transmitted power versus length with the increasing performances of extruded DC cables. Three presenters offered prepared contributions which were discussed in six spontaneous ones. HTSC cable Systems solutions were also included in the discussion. It was stated that due to possible operating temperature limits for DC cables, emergency ratings should also be taken into consideration.

Preferential Subject No.3: State-of-the-art and trends for cable system testing

- Qualification, type testing, routine, sample, after installation testing of cable systems
- Representation of installation and operational stresses in testing of cable systems
- Diagnostic testing of cable systems

This subject had attracted 6 papers for the Special Report, and 14 prepared contributions for the Group Discussion Meeting.

Question 1 aimed to update the state of the art of very low frequency testing of installed cable systems. Five prepared contributions were presented, then four spontaneous contributions highlighted the high interest in this topic confirming the decision of SC B1 to investigate in this matter through a new TF.

Before going to question 2 an invited contribution was given about “Full Scale Testing of long AC Cable lines”. This presentation will be an interesting contribution to the work of current WG B1.30 (Cable Characteristics)

The central matter of Prequalification Testing and repetition of Tong Term testing in some contracts was discussed following question 2. Four prepared contributions exposed different points of view. Three spontaneous contributions followed to complete a long discussion. Thermomechanical behaviour of cable systems and thermomechanical conditions of testing need to be thoroughly considered..

Question 3 regarding the use of Dynamic Thermal Rating, the need of additional recommendations or standards attracted three prepared and two spontaneous contributions. Different opinions about the need of further standards or recommendations were expressed. SC B1 Working Group on rating calculations will investigate in this field to prepare decisions from SC.

Question four about PD measurement and assessment of time available for repair before failure was covered by two prepared contributions and commented by two spontaneous ones.

PD measurements are recognised as useful but not able to cover all the types of faults. It is thus impossible for the time being to give a clear answer to the question. Work in this area is carried out by a current SC WG.

The special reporter made a brief summary of the discussion and the Chairman concluded the meeting by thanking the contributors for their high quality contributions and the audience for the fruitful discussion. He also thanked the Special Reporter and the Secretary for preparations and organisation of the meeting.

This concludes after four years of fruitful work the Chairmanship of Fredrik Rüter. The audience gave him a round of applause and a standing ovation. He then handed over the Study Committee to Pierre Argaut.