



CNC CIGRE SC COMMITTEE MEETING

Vancouver, BC

October 18 2010

SC – B1

Insulated Cables / Câbles Isolés

Ray Awad, Hydro Québec TransÉnergie



SC – B1 **Field of activity of the Study Committee**

- The field of activity of SC B1 concerns the development and operation of all types of AC and DC insulated cable systems for land and submarine power transmission (preferably HV and EHV cables and accessories).
- Within this field, the scope of work of the SC covers theory, design, applications, manufacture, installation, testing, operation, maintenance and diagnostic techniques of insulated cables.



SC – B1 **Mission of the Study Committee**

- To facilitate and develop the exchange of engineering knowledge and information between engineering personnel and technical specialist in the field of insulated cables;
- To add value to such knowledge and information exchanged by synthesising state-of-the-art and world practices;
- To make managers, decision-makers and regulators aware of the syntheses of SC B1's work in the field of insulated cables.



SC – B1 **Goals of the Study Committee**

- To contribute effectively to the progress of insulated cable systems technology;
- To facilitate the integration of insulated cable systems in electric power networks and in the environment, covering the complete life cycle of cables;
- To maintain its leading position in the field of power cables by providing unbiased and neutral information on all essential cable aspects systems;
- To be recognised by the Electric Power Industry (EPI) as a leading and reliable partner with competence in all engineering issues related to insulated cable systems, i.e. technical, economical, ecological and social.



SC – B1 **Composition of the Study Committee**

- The SC currently consists of a Chairman, a Secretary, 24 Regular Members and 8 Observer Members.
- The 24 countries represented by Regular Members are Australia, Austria, Belgium, Brazil, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Korea, Norway, Poland, Portugal, Russia, South Africa, Spain, Sweden, Switzerland, The Netherlands, United Kingdom and United States whilst the 8 countries represented by Observer Members are China, Croatia, Egypt, India, Israel, Malaysia, Mexico, and Romania.
- The 34 constituents of the SC come from Utilities (11), Manufacturers (15) and Universities/Institutes (8).



SC – B1 **Strategic Advisory Group (SAG)**

SAG will assist the chairman in the definition of the strategic direction of SC B1

SAG will initiate the set up of new WGs

Duration: Permanent

Many Working Groups are expected to finish their work by the end of 2009 and presented their preliminary reports in Poznan, Poland .

The term "Task Force" will not be used, only "Working Group".



SC – B1

Customer Advisory Group (CAG) *convener : E. Bergin (IR)*

A common communication strategy of all SC CAG's should be establish through TC. CAG should consider if it is possible to improve the Paris session format.

Duration: Permanent

- Identification of Target Group
- Communication means with TGs
- Collection and mapping of TG's needs
- Collection and evaluation of feed-back from TGs
- Deliverables:
report twice a year.
external actions approval SC Chairman and the SAG



SC – B1 Tutorials Advisory Group (TAG)

Convener : P. Argaut (FR)

Duration: Permanent

Target Groups :

- Students and young engineers;
- Teachers / lecturers in education and training bodies;
- Engineers and managers in the electrical power sector (including civil works);
- Public;

Examples of topics to be covered:

- **Physics** : ageing mechanisms, insulation materials;
- **Components & Products**: design, testing, cables, accessories;
- **Power system impacts** : technical and environmental impacts;
- **System design**:insulation coordination, thermal design;
- **Construction and installation**: innovative techniques;
- **Maintenance**;
- **Asset Management**;
- **Environmental Impact Assessment**.



WG B1-08 (TB 403 issued 2010)

convener : R. AWAD (CA)

Cable systems in multipurpose or shared structures

- SC B1 decided to launch a WG to investigate all aspects related to the co-existence of cable transmission systems and other installations mainly in tunnels and bridges;
- The possibility of using existing structures like railway and motorway tunnels, subways, bridges, gas, water and sewage supplies etc. for the simultaneous installation of electrical power transmission systems is becoming more and more attractive with regard to construction cost, right of way etc. The questions behind this option are not only technical and economical but are also related to mutual impacts during construction, normal operation and hazards, environmental compatibility, safety risks and legal and administrative issues.



WG B1-10 (TB 379 issued April 2009)

convener : B. Rosevear (UK)

Update of service experience of HV underground and submarine cables

Activities

- Information and documents pertaining to previous studies on experience and reliability have been obtained;
- It has been decided that it will be necessary to prepare two questionnaires in order to collect the data;
- In order to facilitate and encourage replies, the questionnaire will be concise and made as simple as possible. Questions will be focussed only on the information required to complete the task;
- Two task teams have been formed to develop draft questionnaires – one for Land cables and a separate task team for Submarine cables;
- Definition of terms used within the questionnaire are being developed;
- The survey on land cable systems will cover the years 2000 to 2004 inclusive;
- The submarine cable system survey will cover the period from 1991 to 2004.



WG B1-11 (*COMPLETED 2009, TB to be issued*)

convener : F. Lesur (FR)

Upgrading and up-rating of underground cable systems

Upgrading:

Applying a solution that leads to improve the performance of a cable system. The performance refers to at least one of the function or property of the cable system:

- transmitted power, service life, environmental impact, safety.

Up-rating:

Applying a solution that allows a cable system to be operated at a current level above its rated current:

- reassessing the current rating (overload conditions, thermomechanical stresses, temperature monitoring, dynamic temperature rating, new calculation procedures, new design parameters);
- decreasing losses (in metallic sheathes, in neighbour cables, in metallic structures or pipes);
- increasing heat transfer (forced cooling, ventilated tunnels, special backfills, filling ducts, irrigating ground surface, hot spot mitigation).



WG B1-22 (Completed, TB to be issued 2010)

convener : K. Leeburn (ZA)

Cable accessories workmanship

Trends identified:

- More
 - Stress, Installers, Systems, Speed;
 - Larger conductors, Length;
 - Monitoring (Thermal, pd), Prefab;
- Less
 - Technical focus (Commodity), Skills (Supervisors, MV migration);
- Change
 - Foil Sheaths, Dry terminations, Water block;
 - Enamel wires.

WG B1-23 (TB to be issued 2011) *convener : H.Orton (CA)*

Impact of EMF on current rating and cable systems

- *Terms of reference*

- Define the correct terminology
- Review practical EMF management methods
- Review practical design and construction considerations
- Review the cost effectiveness of different methods
- Quantify cable ampacity de-rating aspects of the various field management methods

The WG will neither cover any environmental or biological effects of EMF, nor discuss any specific levels of EMF

WG 24 (Completed Tb to be issued 2010)

Convener: Marco

Marelli (IT)

Test procedures for HV transition joints

- **Terms of reference:**
 - Review the range of transition joints (TJ) currently available
 - Review the existing international standards on TJ testing
 - Align voltage levels to those specified in the IEC standards for extruded cable systems
 - Propose test regimes for TJ and their associated cables. Type, routine, sample and after laying tests should be considered.

WG B1. 25 (completed TB to be issued 2010)

Convener: Pierre Maribeau (FR)

Advanced Design of Laminated Metallic Coverings

- Terms of reference:
 - Review and update the test as on cables with extruded insulation and laminated protective coverings
 - Issue a guide to use for non experts explaining what could be the different cable designs



Active Working Groups

- WG B1.28 On site Partial Discharge Assessment
- WG B1.29 Guidelines for maintaining the integrity of XLPE transmission accessories
- WG B1.30 Cable systems electrical characteristics
- WG B1.31 Testing of superconducting cable systems (TF)
- WG B1.32 Recommendations for testing DC extruded cable systems for power transmission at rated voltages up to 500 kV
- JWG B1/B3.33 Feasibility of a common, dry type system up to 500 kV



- NEW WG (approved September 2010)
 - WG B1.34 Mechanical forces in large cross section cable systems (J. Kaumanns)
 - WG B1.35 Cable rating (F. de Wild)
 - TF B1.36 Life Cycle assesement and environmental impact of U/G Cable Systems (R. Awad), to continue establishing terms of reference.
 - WG B1.37 Guide for operation of Fluid Filled Cable Systems (C. Peacock)



Future meetings of B1 SC and related activities

- ICC (IEEE/ PES/ Insulated Conductor Committee) Phoenix, AZ, USA
October 17-21 2010
- Shnanghai, China June 2011
- Jicable'2011 Versailles, France June 19-23, 2011
- WETS 2011 Long Cable Links (Paris June 2011)



Preferential subjects for the 2010 session

1. Technical challenges 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 system installation techniques



Preferential subjects for the 2010 session

2. Key factors in current and foreseen development of cable systems
 - Environmental impact
 - Balancing investment costs (including costs of right of ways) vs life time costs (including costs for operation and maintenance, social costs, losses, dismanteling etc.)



Preferential subjects for the 2010 session

3. State-of-the-art and trends for cable system testing
 - Qualification, type testing, routine testing, sample and after installation.
 - Representation of installation and operational stresses in testing
 - Diagnostic testing of cable systems