



CONSEIL INTERNATIONAL DES GRANDS RÉSEAUX ÉLECTRIQUES A HAUTE TENSION
INTERNATIONAL COUNCIL ON LARGE HIGH VOLTAGE ELECTRIC SYSTEMS

STUDY COMMITTEE B1 INSULATED CABLES

2007 - 2010 ACTION PLAN

Update # 3 - December 2009

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1 FRAMEWORK

The purpose of the three years Action Plan is to outline the main technical and administrative activities that SC B1 expects to carry out in the specified time frame of 2007 through 2010.

It takes into consideration the TC Action Plan as well as the SC B1 2008-2018 Strategic Plan, with which it is in line, as well as specific proposals put forward by Members during Study Committee meetings.

2 TECHNICAL PLAN

This part of the Action Plan summarizes the technical activities, which are currently in progress (N.B. new technical activities consistent with the SC B1 Strategic Plan may be initiated during the validity period of this Action Plan).

The terms of reference of SC B1 AGs, WGs and TFs can be found in **Appendix I**. A one page chart showing all the CIGRE WGs, JWGs, TFs and JTFs in which SC B1 is currently involved is also provided.

2.1 SC Advisory Groups

SC B1 has three permanently installed **Advisory Groups (AGs)**, to deal with strategically important work:

- The **SC B1 Strategic Advisory Group SAG** under the Convenership of the Chairman is an AG with the task to analyse items of fundamental importance and to support the Chairman with preparing strategic decisions. The SAG typically meets once a year.

- The **SC B1 Customer Advisory Group CAG** is an AG with the task to ensure that the needs of the Target Groups are addressed within the work of SC B1. It will co-ordinate all activities in this field and work in close contact with the SC Chairman and the Strategic Advisory Group B1-SAG. The CAG will present its results and recommendations prior to any external action to the B1-SAG, for approval. The Convener of the CAG is also a member of the SAG.

- The **SC B1 Tutorial Advisory Group TAG** is an AG with the Scope to implement SC B1's high ambitions for education, continuous training, tutorials and publications.

The B1-TAG will be the working body within SC B1 to co-ordinate all activities in this field. It will work in close contact with the EPEE, the SC Chairman, the Strategic Advisory Group B1-SAG and the Customer Advisory Group B1-CAG. It will involve all SC B1 Members and Conveners as contacts. The Convener of the TAG is also a member of the SAG.

2.2 SC Working Groups

SC B1 disbanded **two WGs** after their work was published:

- **WG B1.10:** Update of Service experience on underground and submarine cables
- **WG B1.21:** Third party damages on underground and submarine cables

SC B1 currently has **five WGs** finalizing their work:

- **WG B1.08:** Cable systems in multipurpose or shared structures
WG B1.08 was set up in 2004 with Ken Barber (AU) as Convener and replaced by Ray Awad (CA) in 2007. The final report was approved by the SC Chairman and will be published early 2010. Then, the WG will be disbanded.

- **WG B1.11:** Upgrading and Uprating of Underground Cable Systems
WG B1.11 was set up in 2004 with Frédéric Lesur (FR) as Convener. The final draft was presented during the 2007 SC meeting. Some comments were added during 2008, and the report circulated again to SC B1 Members, before final approval and publication.

- **WG B1.22:** Cable accessories workmanship
WG B1.22 was set up in 2005 with Kieron Leeburn (ZA) as Convener and was due to present its final report in 2008. Due to difficulties to prepare the final report, the WG duration was extended for one more year. The final draft was presented during the 2009 SC meeting and circulated for comments to SC B1 Members, before final approval and publication.

- **WG B1.24:** Test procedures for HV transition joints
WG B1.24 was set up in 2006 with Marco Marelli (IT) as Convener and was due to present its final report three years later. The final draft was presented during the 2009 SC meeting and circulated for comments to SC B1 Members, before final approval and publication.

- **WG B1.25:** Advanced design of laminated metallic coverings
WG B1.25 was set up in 2006 with Pierre Mirebeau (FR) as Convener and was due to present its final report three years later. The final draft was presented during the 2009 SC meeting and circulated for comments to SC B1 Members, before final approval and publication.

and **eight WGs** in progress dealing with the following subjects:

- **WG B1.23:** Impact of EMF on current ratings and cable systems
WG B1.23 was set up in 2006 with Harry Orton (CA) as Convener and is due to present its final report in 2009. Due to late Convener's nomination, the WG duration was extended for one more year

- **WG B1.27:** Test recommendations on XLPE AC submarine cables from 170 kV to 500 kV
WG B1.27 was set up in 2007 with Anders Gustafsson (SE) as Convener and is due to present its final report in 2010.
- **WG B1.28:** On site Partial Discharges Assessment
WG B1.28 was set up in 2008 with Nigel Hampton (US) as Convener and is due to present its final report in 2011.
- **WG B1.29:** Guidelines for maintaining the integrity of XLPE transmission cable accessories
WG B1.29 was set up in 2008 with Steve Swingler (UK) as Convener and is due to present its final report in 2011.
- **WG B1.30:** Cable systems electrical characteristics
WG B1.30 was set up in 2008 with Christian Royer (CA) as Convener and is due to present its final report in 2011.
- **WG B1.31:** Testing of superconducting cable systems
WG B1.31 was set up in 2009 with David Lindsay (US) as Convener and is due to present its final report in 2012.
- **WG B1.32:** Recommendations for testing DC extruded cable systems for power transmission at a rated voltage up to 500 kV
WG B1.32 was set up in 2008 with Bjorn Sanden (NO) as Convener and is due to present its final report in 2011.
- **JWG B1/B3.33:** Feasibility of a common, dry type interface for GIS and Power cables of 52 kV and above
JWG B1/B3.33 was set up in 2009 with Pierre Argaut (FR) as Convener and is due to present its final report in 2012. The JWG Terms of reference are not approved by the TC Chairman yet.

2.3 SC Task Forces

SC B1 currently has **four TFs** whose task is to define the terms of reference of potential new WGs, one within SC B1 and the other as a Joint Task Force with SC B3:

- **TF B1.34:** Mechanical forces in large cross section cable systems
TF B1.34 was set up in 2009 to study this specific topic with Johannes Kaumanns (DE) as Convener and is due to present its considerations whether or not to install a full WG on this issue in 2010.
- **TF B1.35:** Cable rating
TF B1.35 was set up in 2009 to study this specific topic with Frank de Wild (NL) as Convener and is due to present its considerations whether or not to install a full WG on this issue in 2010.

- **TF B1.36:** Life cycle assessment and environmental impact of underground cable systems

TF B1.36 was set up in 2009 to study this specific topic with Ray Awad (CA) as Convener and is due to present its considerations whether or not to install a full WG on this issue in 2010.

- **TF B1.37:** Guide operation of fluid filled cable systems

TF B1.37 was set up in 2009 to study this specific topic with Colin Peacock (AU) as Convener and is due to present its considerations whether or not to install a full WG on this issue in 2010.

2.4 Interactions with other CIGRE Committees

- Relations with **interfacing Study Committees**

SC B1 strives to have good cooperative spirit with the neighbouring SCs, and to set up JWGs whenever dealing with technical issues interfacing with cables, or other technical topics with mutual interest. The committees with the more traditional interfaces are B2, B3 and D1, but B4, C1, C3 and C4 could also be partners.

- Relations with **AORC and other Regional Forum**

SC B1 strives to actively take part in AORC meetings. These are seen as alternatives for Asian and Pacific B1 members not being able to make the meetings more far away. We have the same policy when other regional meetings are arranged.

2.5 Interactions with other Organizations

After due considerations, we are open to interact with any other organisation in the field of insulated cables, if we believe it would be beneficial for both parties. We are presently liaising with ICPC (International Cable Protection Committee) as part of our work within that field (WG B1.21). This will be evaluated before any decision is drawn on future interactions.

- Interactions between **CIGRE SC B1 and IEEE/PES Insulated Conductors Committee ICC**

A permanent JTF SC B1/ICC is operational with Willem Boone (NL) as Convener. Moreover, a much appreciated Joint Discussion Group was launched by ICC and SC B1 regularly contributes. B1 will strive to maintain the good relation with ICC, to get a vital and natural link to the North American cable society.

- Interactions between **CIGRE SC B1 and IEC TC20**

The relations between our two Committees are mainly informal, but intensive. The Chairmen (or as appointed) are invited to the other's annual meetings. Specific cooperation (on coming test standards) is desirable.

- Relations between **CIGRE SC B1 and CIRED**

SC B1 will analyse its field of activity with regard to issues which might be of common interest with CIRED and will communicate with CIRED about mutual information, coordination and possible cooperation whenever deemed appropriate.

2.6 Symposia and Colloquia

SC B1 plans to participate in joint symposia wherever appropriate.

In 2009, SC B1 actively participated in a symposium organized by SC B2 on EMF and delivered several contributions in a colloquium organized by SC B4 on HVDC.

3 ADMINISTRATIVE PLAN

This part of the Action Plan summarizes the main administrative actions envisaged by SC B1. Said actions are essentially aimed at securing a wider participation in the SC, increasing its operational efficiency and enhancing the visibility of its activities.

3.1 SC B1 Meetings

In uneven years, all Members are asked to prepare brief presentations of the main events, which had occurred during the past two years in their respective countries in the field of insulated power cable systems. In addition, Members shall identify the main target groups in their countries and consider means how to approach these for mapping their needs and degree of satisfaction with our work. SC Members shall function as interfaces to their local target groups.

3.2 Records of SC B1 Meetings

The Decision List of SC Meetings is a very positive action oriented tool. It is issued immediately after the Meetings (within one week).

The Official Minutes of SC Meetings remain however important for record purposes. Their publication takes place no later than two months after the Meetings.

3.3 New SC B1 WGs and TFs

The "starting transient" of new WGs and TFs will continuously be emphasized. Most technical activities of WG or TF shall start no later than three to four months after said WG or TF have been set up. Members, who indicated during SC B1 meetings that experts from their respective countries will participate in a new WG or TF, have been advised that the associated nomination must be finalized and communicated directly to the relevant Convener, with copies to the Chairman and Secretary, within a maximum of three months. This aspect will be followed up closely in the future, too.

3.4 Progress of SC B1 WGs and TFs

Conveners are asked halfway between SC B1 Annual Meetings to provide a short formal update on the progress of their respective WGs and TFs (one page report to be sent to the Chairman and the Secretary by the end of February of each year).

3.5 SC B1 Publications

Efforts to eliminate delay with publications as experienced in previous years were successful. Conveners have been reminded that the final reports of their respective WGs should be "publication ready" when they are submitted to the Chairman and to SC Members, respectively, for final approval. Good progress was achieved by small

editorial teams, which, based on comments of SC members, prepared the final versions of the respective documents for publication in ELECTRA or as Technical Brochures:

Two publications were made in 2009:

- WG B1.10: Update of Service experience on underground and submarine cables, (executive summary in Electra 243 – April 2009 and Technical Brochure 379),
- WG B1.21: Third party damages on underground and submarine cables, (executive summary in Electra 247 – December 2009 and Technical Brochure 398),

Five publications are due to be presented in 2010:

- WG B1.08: Cable systems in multipurpose or shared structures
- WG B1.11: Upgrading and upgrading of existing cable systems
- WG B1.22: Cable accessories workmanship
- WG B1.24: Test procedures for HV transition joints
- WG B1.25: Advanced design of laminated metallic coverings

As the central office is presently overwhelmed by publications, SC B1 will carefully follow the publication process.

3.6 Tutorials

Each WG closing should also prepare a tutorial. This has worked very well, and we now have quite a extensive library of prepared tutorials, free for all SC members to use when- and wherever appropriate.

3.7 SC B1 Web site

SC B1 created a Web site www.cigre-b1.org hosted by the Central Office in August 2000 and the Secretary was nominated as Web Master.

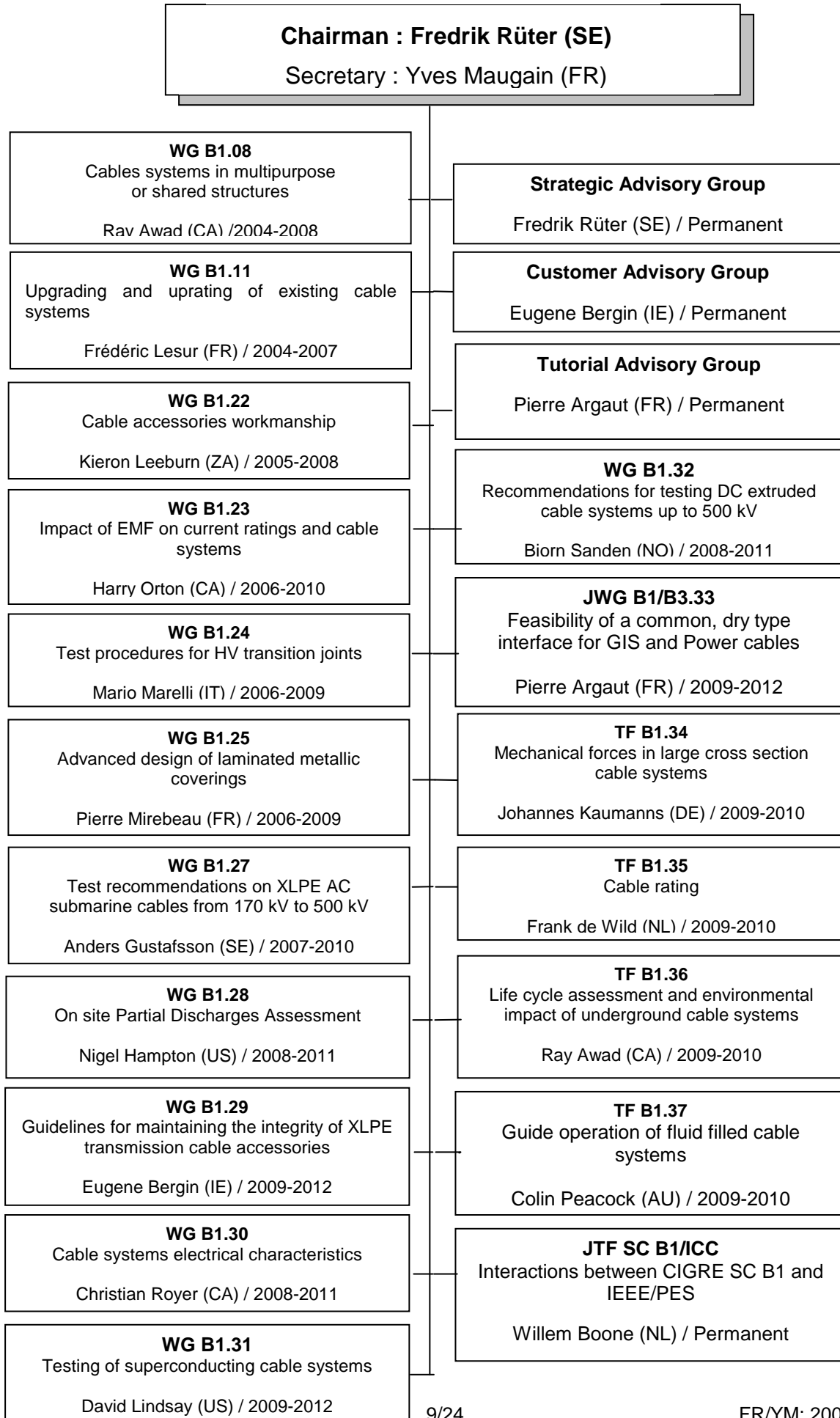
The new SC B1 web site is on line since June 15, 2005 and is regularly updated.

This web site has become a very important tool in recent years. It is more and more visited and is regularly updated.

APPENDIX I: Advisory Group, Working Group and Task Force Forms

December 2009

CIGRE SC B1





Study Committee No: B1

WORKING BODY FORM

Group No: B1-SAG	Name of Convener: F. Rüter (SE)
TITLE of the Group: B1-Strategic Advisory Group	
Scope, deliverables and proposed time schedule of the Group: <ul style="list-style-type: none">• A permanent Strategic Advisory Group (SAG) was set up, which terms of reference are to assist the Chairman in the definition of the strategic directions that should be followed by SC B1.• The SAG is composed of a limited number of members: the Chairman, who will convene, the SC Secretary, and a few other SC Members or experts, all chosen by the Chairman.• The Conveners of the other SC B1 Advisory Groups are permanent members of the SAG.• The SAG will consider, if needed, the set up of other specialized Advisory Groups and will decide about the use of their outcomes.• The SAG will initiate, whenever appropriate, the set up of new TFs or WGs.• The SAG will meet at least once a year, but will communicate as required. <p>Created: 2002, Duration: permanent</p>	

Countries represented: AUSTRALIA, FRANCE (2), IRELAND, SWEDEN, The NETHERLANDS, UNITED KINGDOM, UNITED STATES, ITALY.

Date : Update December 2009



**Study Committee No : B1
WORKING BODY FORM**

Group No : B1 – CAG	Name of Convener : E.Bergin (IE)
TITLE of the Group : B1- Customer Advisory Group	
Scope: A permanent Customer Advisory Group was installed in SC B1 with the Scope to implement CIGRE TC's suggestion, that "Study Committees have to ensure that the needs of their Target Groups are fulfilled." The B1-CAG will be the working body within SC B1 to co-ordinate all activities in this field. It will work in close contact with the SC Chairman and the Strategic Advisory Group B1-SAG and will involve all SC B1 members as contacts and interfaces to their national or local customers. The Terms of Reference (ToR) of the B1-CAG are as follows: 1. Identification of Target Group <ul style="list-style-type: none">- systematically identify SC B1's Target Groups in different countries- listing of respective organizations, persons, social groups, etc.- analysing of organizational levels and hierarchies- identifying of most important and influential addressees 2. Communication means with TGs <ul style="list-style-type: none">- develop systematic and effective concepts for active contacts and communication- consider how to implement sustainable communication links to organizations and persons- consider how to disseminate most effectively B1's activities and outcomes to TGs- propose appropriate presentations (Paris Session, Tutorials, Symposia, etc.) in accordance with the TAG 3. Collection and mapping of TG's needs <ul style="list-style-type: none">- identify problems and map systematically needs of TGs- propose review/revision of current SC B1 activities with regard to needs of TGs 4. Collection and evaluation of feed-back from TGs <ul style="list-style-type: none">- collect and map the degree of TG's satisfaction- evaluate the findings and derive, if necessary, measures for improvements and new actions- identify opportunities to increase TG's satisfaction- coordinate activities at national level where appropriate Deliverables: B1-CAG will present their findings regularly to the SC, at least twice a year as all other working bodies or additionally whenever appropriate. External actions will only be taken after approval by the SC Chairman and the B1-SAG, respectively. Created: 2003, Duration : permanent The Convener is a permanent member of the B1-SAG World regions represented : AFRICA, NORTH AND CENTRAL AMERICA, SOUTH AMERICA, ASIA, OCEANIA, MIDDLE EAST, EASTERN EUROPE, WESTERN EUROPE	
Date : Update December 2009	



Study Committee No : B1

WORKING BODY FORM

Group No : B1 – TAG	Name of Convener : P. Argaut (FR)
TITLE of the Group : B1- Tutorial Advisory Group	
Scope: A permanent Tutorial Advisory Group was installed in SC B1 with the Scope to implement CIGRE TC's suggestion, that "Study Committees have to deal with education, continuous training, tutorials and publications". The B1-TAG will be the working body within SC B1 to co-ordinate all activities in this field. It will work in close contact with the EPEE, the SC Chairman, the Strategic Advisory Group B1-SAG and the Customer Advisory Group B1-CAG. It will involve all SC B1 Members and Conveners as contacts.	
The Terms of Reference (ToR) of the B1-TAG are as follows:	
<ol style="list-style-type: none">1. Identification of the potential groups interested in education, continuous training, tutorials or technical presentations<ul style="list-style-type: none">- identify SC B1's Tutorial Target Groups in different countries,- listing of respective organisations: students, young or older engineers, universities, etc...,- identification of the respective expected topics to be taught and training levels,- identification of other learned societies, IEE, IEEE,....2. Identification of the means to disseminate the SC B1 knowledge<ul style="list-style-type: none">- prepare the structure of appropriate presentations (Paris Session, Tutorials, Symposia, events organised by other learned societies, etc.) in accordance with the CAG3. Collection of SC presentations<ul style="list-style-type: none">- establish an education and training procedure- preparation of a standard presentation,- each SC working body will prepare a full presentation (up to 30 slides),- the TAG will prepare a synthetic presentation (up to 4 slides)4. Coordination of activities with EPEE and with other SCs	
Deliverables: B1-TAG will present their findings and their productions regularly to the SC, at least twice a year as all other working bodies or additionally whenever appropriate. External actions will only be taken after approval by the SC Chairman and the B1-SAG, respectively.	
Created: 2004 , Duration : permanent	
The Convener is a permanent member of the B1-SAG	
Members : POLAND, SOUTH AFRICA, SPAIN, The NETHERLANDS, UNITED STATES, GERMANY, EGYPT, GREECE	
Approval by TC Chairman : Add Greece	Date : Update Dec 2009



Study Committee No : B1

WORKING BODY FORM

Rev a: October 2007

Group No : WG B1-08

Name of Convener : R. AWAD (CA)

TITLE of the Group : Cable systems in multipurpose or shared structures

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.

SC B1 decided to launch a WG, which shall investigate all aspects related to the co-existence of cable transmission systems and other installations in the same structure.

The Scope of Work shall be:

- MV, HV and EHV cable systems
- Solid, fluid and gas insulated cable systems (including GIL *)
- Multipurpose tunnels and structures shared with transport services (roads, rail and subways), piped services (water, oil, gas and sewage) and other utilities (other electricity services, telecommunications).

Terms of Reference

- Establish the appropriate terminology
- Collect comprehensive global information and experience on the installation of cable systems in multipurpose or shared structures, using an adequate questionnaire developed by the WG.
- Collate, summarise and review the information.
- Identify the issues that need to be considered when installing underground cable systems in multipurpose or shared structures

The investigation shall consider, but not be limited to, technical aspects such as type of cables, design of structures, construction, installation, other infrastructure installed, mutual impacts, maintenance, repairs and operational constraints. It shall also address economical, occupational health and safety, environmental, administrative, legal and decision-making aspects.

- Recommend guidelines for the practical application of cable systems in such installations.

*) Specific technical aspects of GIL will be investigated by a separate JWG B3/B1.09 which will give relevant technical input to WG B1-08. The groups will share information by mutual participation of at least one of their members.

Created: 2004, **Duration:** 3 years, **Extension:** 1 year

Deliverables : A final report to be submitted and discussed at 2008 SC B1 meeting.

Countries represented: AUSTRALIA, AUSTRIA, CANADA, FRANCE; ITALY; JAPAN; KOREA; SINGAPORE; SPAIN, SWEDEN; UK; USA

Approval by TC Chairman : Aldo Bolza

Date : December 10, 2004

Rev a: Extension of one year and change of Convener due to difficulties to get information



Study Committee No : B1

WORKING BODY FORM

Group No : WG B1 – 11	Name of Convener : Frédéric Lesur (FR)
TITLE of the Group : Upgrading and Uprating of Underground Cables	
Terms of Reference : <ul style="list-style-type: none">• To review the literature on similar subjects (IEC, CIGRE, IEEE publication),• To establish the appropriate terminology,• To inventory the possible technical solutions for increasing the transmitted power in an existing cable system, or extending the life duration of the cable system• To gather available utility experience in such cases,• To list the technical and environmental issues to be addressed in such cases,• To propose a step by step approach.	
Scope of work : <ul style="list-style-type: none">• AC and DC cables• Extruded and lapped cables• Land and submarine cables• Cooling systems.	
Created: 2004 , Duration : 3 years	
Members : BELGIUM, CANADA, DENMARK, FRANCE, GERMANY, ITALY, The NETHARLANDS, SPAIN, SWEDEN, UNITED KINGDOM, UNITED STATES	
Deliverables : <p>A final report to be submitted and discussed at 2007 SC B1 meeting. The final report will be published as a Technical brochure early 2008 after validation by the SC. A 6 page Electra paper will introduce it.</p> <p>If appropriate, a paper will be written for Jicable'2007.</p> <p>In addition, a tutorial will be prepared to disseminate the work done by the WG.</p>	
Approval by TC Chairman : Aldo Bolza	Date : December 30, 2005

Revised in October 2005: Update of Deliverables



Study Committee No : B1

WORKING BODY FORM

Group No : WG B1.22	Name of Convener : Kieron Leeburn (ZA)
TITLE of the Group : "Cable accessories workmanship"	
Terms of reference	
Background : One of the trends in the cable technology is the reduction of the cable insulation thickness and therefore the growing of electrical stress based on a better knowledge of the insulating material and the extrusion process. As the cables are made under well-defined factory conditions, their quality and reliability are usually assured. Accessories, however, are mounted on site, and even if this job is done by skilled and trained jointers, it is realized in more delicate and undefined conditions than in the factory. In view of safeguarding the cable system's reliability which utilities rely on, it is important to study the electrical stress limits in the different types of joints, to learn about the safety margins between theoretical and practical strength levels, to examine the necessary skills of jointers and relative Quality Assurance and to study the recent service experience of high stressed cables.	
Objectives :	
<ul style="list-style-type: none">• To review the literature on the subject• To complete the terminology not covered by TB 177 "Accessories for HV cables with extruded insulation"• To prepare an easy to understand guide that could be useful for non-technical customers aligned to IEC voltage ranges• To prepare guidelines for jointers training. The objective is to have this document referenced in call for tenders	
Scope :	
<ul style="list-style-type: none">• HV Extruded AC >30kV cable systems only (MV and HTS cables are excluded)• Land cable systems• Special considerations may be needed for large conductors• Accessory designs and terminations• Interface preparation (Different methods)	
Created: 2005, Duration : 3 years, Extension: 1year	
Deliverables and time schedule : A standard 6 page Electra article, a final report (that will be published as a technical brochure) to be submitted and discussed at 2008 SC B1 meeting and a tutorial in collaboration with the TAG.	
Countries represented: Australia, Belgium, Canada, Denmark, France, Germany, Ireland, Israel, Italy, Japan, Korea, The Netherlands, Romania, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States.	
Approval by TC Chairman : Aldo Bolza	Date : December 30, 2005

A : revised in October 2006: Delete submarine cables. Change Type of joints by Accessory designs

B : Extension 1 year



Study Committee No : B1

WORKING BODY FORM

Group No : WG B1.23	Name of Convener : Harry Orton (CA)
TITLE of the Working Group : IMPACT OF EMF ON CURRENT RATINGS AND CABLE SYSTEMS	
Background: Numerous methods have been devised by electric utilities and various research organizations to manage power frequency magnetic field levels in the vicinity of underground cable systems. Although information will be available (ongoing work TF C4.2.04) concerning considerations for implementing the various methods, their impact on construction, their cost effectiveness, and their impact on cable ratings needs to be evaluated. In particular, there are differing opinions about the derating effects of transmission cables placed in ferromagnetic shielding structures such as pipes and casings. Past work at Cigre and elsewhere addressed magnetic field calculation procedures (with and without ferromagnetic components), however, they do not address the derating impact of the magnetic field management methods or their practical application to electric utility systems.	
Terms of Reference: <ul style="list-style-type: none">• To define the correct terminology for field management techniques.• To review practical magnetic field management methods that are currently used for underground transmission cable systems.• To quantify the shielding effectiveness of practical methods.• To review practical design and construction considerations relating to engineering, standardization of components, scalability, constructability, environmental suitability of component materials, impact by third party damage, reduction of rating due to air inclusions, corrosion, theft of materials, logistics, and worker skill level.• To review the cost effectiveness of different field management methods.• To quantify the cable ampacity de-rating aspects of the various field management methods	
This working group will neither cover any environmental or biological effects of EMF, nor discuss any specific levels of EMF.	
Scope of work : The work shall focus on single conductor, high voltage, AC land cable systems, excluding pipe type cables with : <ul style="list-style-type: none">• Extruded dielectric insulation• Laminar dielectric insulation	
Deliverables: The deliverables shall consist of an Electra article, a technical guide (containing technical data, discussion, and case studies), as well as a tutorial for presentation at CIGRE conferences and workshops.	
Created: 2006 Duration : 4 years	
Convener e-mail: (h.orton@ieee.org and/or heorton@msn.com)	
Members : Belgium, Brazil, Canada, France, Germany, Italy, The Netherlands, Norway, Spain, Switzerland, United Kingdom, United States	
Approval by TC Chairman :Klaus Fröhlich	Date : Jan. 9th, 2007
Extension 1 year	



Study Committee No : B1

WORKING BODY FORM

Group No : WG B1.24

Name of Convener : Marco MARELLI (IT)

TITLE of the Group : Test procedures for HV transition joints

Background:

Extruded cable is increasingly being used for transmission and distribution circuits in preference to cables with lapped insulation. It is becoming more common for a length of extruded cable to be introduced into a lapped cable circuit, when the latter is repaired or diverted. International cable specifications are generally written to cover a specific insulation technology e.g. IEC 60840 applies to cables with extruded insulation and their accessories. Applications that involve cables with more than one insulation system are not usually considered. The test regimes differ between lapped paper and extruded polymeric insulation; for example an AC after laying test might be used with extruded cable and a DC test with paper cable.

Terms of Reference:

- To review the range of transition joints currently available
- To review the existing international standards and the extent to which they cover the testing of transition joints
- Align voltage levels to those specified in IEC Standards for extruded cable systems
- To propose test regimes for transition joints and their associated cables. Type, routine, sample and after-laying tests should be considered.

Scope of work :

The WG should take into account ac cables and accessories for rated voltages above 30 kV up to 500 kV. Transition joints in submarine or DC cable systems are not considered. Priority should be given to jointing paper cables with extruded cables, in particular SCFF cables with XLPE cables. All forms of testing should be considered. Priority shall be given to after-laying and type tests.

Deliverables:

The WG should provide recommendations on type, routine, sample tests for transition joints.
The WG should provide a recommendation on site testing of transition joints.
The WG will also provide an Electra article and a tutorial for presentation at CIGRE conferences and workshops.

Created: **2006**, Duration : **3 years**

Members: Australia, Belgium, Canada, China, Denmark, France, Germany, India, Ireland, Italy, Japan, Korea, The Netherlands, Sweden, United Kingdom, United States

Approval by TC Chairman : Klaus Fröhlich

Date : Nov. 12, 2006



Study Committee No : B1

WORKING BODY FORM

Group No : WG B1.25	Name of the Convener : Pierre Mirebeau (FR)
TITLE of the Group : Advanced Design Of Laminated Metallic Coverings	
Background: WG 21.14 published in 1992 "Guidelines for tests on high voltage cables with extruded insulation and laminated protective coverings". Numerous improvements appeared on laminated coverings since then in parallel with field experience. We now have a feed back relative to their use as a function of the length to be laid, the installation method (ducts, directly buried...), the environment, the design of the metallic screen (aluminium, copper wire screen + aluminium, copper...), the connection and grounding of the screen (single point, cross bonding, double point)... In parallel, new processes and new installation methods have appeared.	
Terms of Reference: <ul style="list-style-type: none">• To review and update the tests on cables with extruded insulation and laminated protective coverings taking into account the system view, i.e. the installation of accessories. Tests on cable, on accessories and on the system itself should be addressed, including the short circuit one• To issue a Guide to Use for non experts explaining what could be the different cable designs	
Scope of work : <ul style="list-style-type: none">• Extruded cable systems only• AC cable systems only with a focus above 36 kV• Land cables	
Deliverables: The output should be an updated recommendation for tests on high voltage cables with extruded insulation and laminated protective coverings that includes a guide (for non-technical readers) with the aim to get customers to reference this guide. Moreover, the WG will provide an Electra article and a Tutorial for presentation at Cigre conferences and workshops.	
Created: 2006 , Duration : 3 years	
Members : Australia, Brazil, China, Finland, France, Germany, India, Italy, Japan, Norway, Sweden, United Kingdom, United States	
Approval by TC Chairman : Klaus Fröhlich	Date : Jan. 9 th , 2007



Study Committee No : B1

WORKING BODY FORM

Group No : WG B1.27	Name of Convener : Anders Gustafsson (SE)
TITLE of the Working Group : Recommendations for testing of long AC submarine cables with extruded insulation for system voltage above 150 (170) kV to 500 (550) kV	
Background: For a long time the prevailing highest voltage for XLPE submarine AC cables was 170 kV. A recent submarine installation of single-core XLPE AC cables at 420 kV has moved the technology forward significantly. The existing Recommendations on AC submarine cables are presently limited to 170 kV. It is considered necessary to prepare test recommendations on XLPE AC submarine cables from 170 kV to 500 kV.	
Terms of Reference: <ul style="list-style-type: none">• Examination of relevant IEC standards / CIGRE recommendations and documentation.• The work should adopt a system approach. Particular attention should be paid to repair joints as part of the sub-marine cable system and the Working Group should consider tests with external water pressure, heat cycling and mechanical handling (during installation of a repair joint).• The work should propose development and prequalification tests for the EHV submarine cable system and re-qualification in case of minor or major changes and define the range of prequalification and type approval for EHV submarine cable systems.• The work should propose tests for long submarine cable lengths - both in the factory and after installation and explain clearly the basis for the recommended tests and the range of application.• The work should include a review of the currently available technologies for sub-marine cable and joint design and consider possible implications for testing• A Technical Brochure should be prepared for publication	
A recommendation should be prepared to Cigré B1 on the revision of "Recommendations for testing of long AC submarine cables with extruded insulation for system voltage above 30 (36) to 150 (170) kV". This review should be performed based on the new edition of IEC 60840.	
Deliverables: <ul style="list-style-type: none">• The Working Group should prepare a Technical Brochure and a tutorial.• Recommendation for revision of "Recommendation for testing of long AC submarine cables with extruded insulation for system voltage above 30 (36) to 150 (170)kV"	
Created: 2007 Duration : 3 years	
Members : Canada, Denmark, France, Ireland, Italy, Japan, Netherlands, Norway, Spain, Sweden	
Approval by TC Chairman : Klaus Fröhlich	Date : 28-11- 2007



Study Committee No: B1

WORKING BODY FORM

Group No : WG B1.28	Name of Convener : Nigel Hampton (US)
TITLE of the Working Group : On-site Partial Discharge Assessment of HV and EHV cable systems	
Background: Cable Systems undergo various steps in testing, specifically tests after installation. To provide additional information after installation, on-site pd measurements may be undertaken. Such measurements under field conditions may be complicated to perform, and complex to analyse, but can provide valuable data on the quality of the cable installation. There is a significant interest from the owners of using these techniques both for verifying the sound installation, but also for the purpose of diagnostic testing during the life of the cable system. The work of this WG, that has the strong support of IEC TC 20, will fill the need of widely accepted guidelines.	
Terms of Reference: The work should be limited to HV and EHV extruded AC cables, but addressing both commissioning and diagnostic testing, The WG shall: <ul style="list-style-type: none">- collect experience with PD testing, with respect to methods/equipment and results- evaluate the added value of the PD testing at site for commissioning and diagnostic testing- evaluate the applied technology, taking into account what previous CIGRE and ICC WG's have done so far- recommend the protocol, to validate the on-site measurement results (calibration, sensitivity assessment)- recommend guidelines for PD test procedures at site (voltage level, measuring time, measuring conditions)- identify widely acceptable requirements for commissioning and diagnostic testing	
Deliverables: <ul style="list-style-type: none">• An Executive Summary article for Electra• A full report to be published as a Technical Brochure• A Tutorial	
Created: 2008 The full report shall be made available for final review at the B1 annual meeting in 2011.	
WG members from: AU, BE, BR, CA, HR, DK, FR, DE, IT, JP, KR, NL, PO, ES, SE, CH, UK, US.	
Other stakeholding SC's: D1	
Approval by TC Chairman : Klaus Fröhlich	Date : 03/11/2008



Study Committee No : B1

WORKING BODY FORM

Group No : WG B1.29	Name of Convener : Eugene Bergin (IE)
TITLE of the Working Group : Guidelines for maintaining the integrity of XLPE transmission cable accessories	
Background: The work is motivated by the occurrence of disruptive failures of cable end terminations, with consequent risks for personal and material loss and damage.	
Terms of Reference: The scope shall be limited to land XLPE cable systems at 110 kV and above. Priority shall be given to outdoor and oil-immersed terminations, but also joints (that are not directly buried) shall be considered. The work shall concentrate on recent incidents, but near misses shall also be included in the analysis. The WG shall: <ul style="list-style-type: none">• Review recent experience with failures of outdoor and oil-filled terminations• Review the consequences of termination failures for cables within substations and outside.• Examine the role of design, assembly and quality control in mitigating the effects of termination failures• Examine the role of testing (development, type, routine & after-laying) and condition monitoring in minimising the incidence or severity of termination failures• At the SC B1 meeting in 2010, the WG shall provide recommendations on possible extensions of work into joints (not directly buried), and accessories for oil-filled cable.• The full report shall be made available for final review at the B1 annual meeting in 2011.	
Deliverables: <ul style="list-style-type: none">• An Executive Summary article for Electra• A full report to be published as a Technical Brochure• A Tutorial	
Created: 2009 Duration: 3 years	
Convener e-mail: bergin_eugene@yahoo.co.uk	
WG members from: AU, BE, BR, CA, FR, DE, IN, IT, JP, KR, NL, NO, ES, CH, UK, US	
Other stakeholding SC's: B2, B3, C3	
Approval by TC Chairman : Klaus Fröhlich	Date : 03/11/2008

Change Convener and relaunch WG



Study Committee No : B1

WORKING BODY FORM

Group No : WG B1.30	Name of Convener : C. ROYER (Canada)
TITLE of the Working Group : Review of Cable Systems Electrical Characteristics	
Needs of Target Groups:	
Background: It is now well known that underground transmission cables have significantly different electrical characteristics than overhead lines, and that these differences must be taken into account during cable system planning, design, and operation. For all these topics, reliable input data are necessary and therefore accurate impedance calculations are of the highest importance. This is not always easy to achieve. In-depth analysis of the topics related to cable integration in network may require sophisticated calculation computer programs and a detailed and reliable knowledge of the components and system characteristics at any time.	
Terms of Reference:	
<ul style="list-style-type: none">• To prepare proper definitions for "Cable Characteristics"• To list relevant cable systems types: cable construction, configuration of installation, bonding• To list the information to be collected for each cable system study• To review relevant formulae existing in literature• To identify relevant missing formulae when necessary• To establish if possible these formulae or propose alternate methodology• If possible, to collect and analyse case studies	
Scope of work :	
<ul style="list-style-type: none">• Paper cable systems (SCFF and HPFF) for land and submarine AC applications• Extruded cable systems for land and submarine AC applications• Power frequency• Voltage range 45 kV and above	
Deliverables:	
<ul style="list-style-type: none">• Final report in 2011• Technical brochure and Electra paper in 2011• Tutorial	
Created: 2008 Duration : 3 years	
Members : Belgium, Canada, Denmark, Finland, France, Greece, Israel, Italy, Korea, Mexico, South Africa, United States	
Other stakeholding SCs: D2, C2, C4, B5	
Approval by TC Chairman :Klaus Fröhlich	Date :30/03/2009



Study Committee No : B1

WORKING BODY FORM

Group No: WG B1.31	Name of Convener : Dave LINDSAY (US)
TITLE of the Working Group : Testing of superconducting cable systems	
Background: IEC TC20 and TC90 has requested B1 to provide testing recommendations for HTSC cable systems, as the technology has made notable progress during the last years.	
Terms of Reference: 1.Scope of the WG should be limited to AC High Temperature Superconductors (HTS) only and exclude those materials considered Low Temperature Superconductors (LTS). Voltage range: 10 to 145 kV 2.Cryogenic cooling hardware is outside the scope. However, Performance specification, reliability, functional requirements should be addressed 3.The WG shall collect detailed experience from existing HTS cable projects. 4.The WG shall address HTS cable systems operating under normal and short circuit conditions – including cable, joints and terminations. 5.The guideline shall include considerations for all known cable design options including single-core, three-core and three concentric phases. 6.The guideline shall address those test requirements associated with design and operation of a pressurized piping and pressure-vessel system as applicable to HTS cable systems. 7.The WG shall recommend testing requirements and guidelines for HTS cable system in the following areas: <ul style="list-style-type: none">· Type / Qualification tests· Factory Tests· After Laying Tests	
8.The WG shall discuss and document the prospective of technology up scaling to 275 kV	
<ul style="list-style-type: none">• The full report shall be made available for final review at the B1 annual meeting in 2013.	
Deliverables: <ul style="list-style-type: none">• An Executive Summary article for Electra• A full report to be published as a Technical Brochure• A Tutorial	
Created: 2009	
WG members from: CA, FR, DE, KO, IT, JP, NL, ES, US	
Other stakeholding SC's: C3	
Approval by TC Chairman : Klaus Fröhlich	Date : 08/01/2010



Study Committee No : B1

WORKING BODY FORM

Group No : WG B1.32	Name of Convener : B. Sanden (NO)
TITLE of the Working Group : Recommendations for testing HVDC extruded cable systems for power transmission at a rated voltage up to 500 kV	
Background: TB 219, published in 2003, deals with the same subject matter, but limited to 250 kV. Today cable systems above that voltage are available. An update to 500 kV is needed.	
Terms of Reference: <u>General scope of work :</u> <ul style="list-style-type: none">• To prepare recommendations for testing of HVDC extruded cable systems at rated voltages up to 500 kV	
<u>The WG shall work in 2 steps :</u> <ul style="list-style-type: none">○ Review existing recommendation in TB 219 to higher voltage levels that may be required for commercial projects in the near future, e.g. 350 kV, and draw conclusions on applicability and modifications○ Develop a recommendation for rated voltages up to 500 kV	
<u>The work scope and structure shall to greatest extent possible follow the content and structure of TB 219, i.e:</u> <ul style="list-style-type: none">• A survey of existing laboratory and operational experience shall be carried out by WG members.• The recommendation shall cover the voltage range where laboratory and/or operational experience exist. The WG shall, however, assess the impact of extrapolation of the recommendation to 500 kV.• The recommendation shall consider both submarine and land applications, with due consideration to the aspects related to testing of long lengths of cables.• The recommendation shall cover electrical, thermal and mechanical aspects.• Where appropriate standards/recommendations exist, the WG shall recognise and refer to these, with particular attention to the specifics related to the electrical aspects of extruded DC cables. In case the existing standards not being appropriate, the WG shall identify this issue and either propose a resolution or refer the issue to the SC.	
The recommendation shall at least cover : <ul style="list-style-type: none">• Prequalification tests, Type tests, Routine tests, Sample tests, and After installation tests• The WG may consider a range of type approval and, if applicable, tests/verifications that may demonstrate the consistency between the prequalified system and the actual system to be supplied.• The recommendation shall take actual operational and installation conditions into account (e.g. ambient temperature, polarity reversal, impulse level, etc.), when developing the test conditions and requirements.	
Deliverables: Step 1: - A short report, to be published in Electra, summarizing the findings for step 1 (ready 2009) Step 2: - An Executive Summary article for Electra (ready 2011) - A full report to be published as a Technical Brochure (ready 2011), to be presented also to IEC TC20 - A Tutorial (ready 2011)	
Created: 2008, Duration 3 years	
WG members from: CA, DE, FR, IT, JP, KR, NO, SE, US	
Other stakeholding SC's: B4	
Approval by TC Chairman : Klaus Fröhlich	Date : 4/12/2008