



**2004 SC B1 PROGRESS REPORT  
(INSULATED CABLES)**

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## 1 Overview

The main highlights of 2004 are:

- The 40<sup>th</sup> CIGRE Session with a SC B1 discussion meeting with around 300 people attending and debating 12 questions through 66 prepared and 14 spontaneous contributions. The organisation and the quality of the contributions made it a very active and lively forum of international experts,
- A questionnaire was distributed to the audience during the discussion meeting to get further information on the actual needs of customers and their satisfaction with the work done by the SC. The evaluation of the questionnaire will provide SC B1 with an opportunity to address outstanding issues over the next few years.,
- An important renewal of the SC Members giving the Committee the chance to have younger Members and for the first time a touch of femininity with two ladies acting as SC Member. Five Regular Members and two Observer Members were renewed,
- In addition, SC B1 was very proud to welcome a new Observer member from the People's Republic of China,
- The SC launched a Tutorial Advisory Group (TAG) to assist the Chairman in the definition of strategic directions that should be followed by the SC in terms of education, continuous training and tutorials.
- The SC disbanded three Working Groups (WGs) and two SC Task Forces (TFs) at the foreseen deadlines, the relative publications are or will be published soon,
- The SC launched four WGs, and two Task Forces, the latter having both to prepare the terms of reference of potential WGs and joined a new JWG led by SC B3.

## 2 SC organisation

The activities of CIGRE Study Committee B1 concern all types of AC and DC insulated cable systems for land and submarine connections and are focused mainly on high voltage applications. Whenever appropriate, however, lower voltage applications are also considered.

Within this field, the scope of work of the Study Committee covers theory, design, applications, manufacture, installation, testing, operation, maintenance and diagnostic techniques.

The main goals of the SC B1 are the following:

- to contribute effectively to the progress in 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,
- to be recognised by the Electric Power Industry and others as a leading and reliable partner with competence in all engineering issues related to insulated cable systems, i.e. technical, economical, ecological and social.

The basic operating structures of the SC are its Working Groups. Their effective performances are based on a clear definition of their terms of reference and on work plans with specific time limits (typically three years).

In order to achieve this, it is the normal practice of SC B1 to set up an *ad hoc* Task Force (TF) to define the terms of reference of a new WG prior to its establishment. The duration of this type of TF must not exceed one year.

SC TFs may also be set up to study and/or update specific topics that do not justify the establishment of a full WG.

The SC is composed by 24 Regular Members, 9 Observer Members, a Secretary and a Chairman, 12 coming from Utilities, 14 from Manufacturers and 9 from Universities/Institutes.

The SC B1 has its web site at the following address: [www.cigre-b1.org](http://www.cigre-b1.org). The SC Secretary is also the web master. The SC web site is at present under full revamping to cope with the lay-out of the main CIGRE web site and to offer the different Working Groups a private space for their exchange of documents. The new site will be available by mid 2005.

### 3 Publications

Published between August 2003 and August 2004

WG/TF number	Name of the Publication	Publication in Electra	Publication date and number of the technical brochure
E. Dorison (FR)	Erratum: Calculation of temperatures in ventilated cable tunnels (Electra 144)	Electra 209	August 2003
K. Barber (AU)	Report on the recent AORC Panel Regional Workshop in Malaysia	Electra 210	October 2003
K. Leeburn (ZA) R. Schroth (DE)	Tutorial on thermal environment and monitoring-based dynamic current rating of underground cables	Electra 211	December 2003
TF B1-10	Thermal ratings of HV cable accessories	Electra 212	February 2004
WG B1-02	Optimization of power transmission capability of underground cable systems using thermal monitoring	Electra 213 TB 247	April 2004
WG B1-19	Technical and environmental issues regarding the integration of a new HV underground cable system in the network	Electra 215 TB 250	August 2004

To come

WG/TF number	Name of the Publication	Publication type	Publication date
TF B1-16	Review of "Recommendations for tests of power transmission DC cables for a rated voltage up to 800 kV"	Electra	Spring 2005
WG B1-05	Transients affecting long cables	Electra Technical brochure	Spring 2005
WG B1-03	Large conductors and composite screens	Electra Technical brochure	Spring 2005
WG B1-04	Maintenance of HVAC underground cables and accessories	Electra Technical brochure	mid 2005

WG/TF number	Name of the Publication	Publication type	Publication date
WG B1-18 TF B1-13	Special bonding of HV cables	Electra Technical brochure	mid 2005

TB : Technical brochure

## 4 2005 main events

The hosting Country of the 2005 SC B1 Meeting is Sweden and a tutorial will be held previous to the Meeting for the Swedish experts. The Meeting is scheduled from September 14<sup>th</sup> 2005, to September 16<sup>th</sup>.

## 5 2006 main events

As usual, CIGRE will hold a Session on August 28 – September 1 in Paris. The Preferential Subjects for the SC B1 Discussion Meeting are:

### PS 1: Products development and new installations of High voltage AC and DC underground and submarine cable systems

- latest state of the art of cables and accessories
- improvements and developments of products and systems
- testing
- new installations

### PS 2: Operation and maintenance of High voltage AC and DC underground and submarine cable systems

- service experience
- monitoring and diagnostics
- operation and maintenance policies and practices
- up-rating, upgrading
- life cycle assessment

### PS 3: Cable systems in the changing operating environment

- environmental restrictions , social awareness
- economical constraints
- relevant issues from dispersed generation
- relevant issues from distribution systems
- utilisation of existing assets

## 6 Administrative report

### 6.1 New SC Members

According to CIGRE rules, and this only happens on even years, the SC Members which term of office have ended should be replaced.

In 2004, SC B1 welcomed five new regular Members from Ireland, Denmark, Poland, Sweden, Switzerland, and three new observer Members from China, India, Romania, China being for the first time Member of our Committee.

Seven Members saw their term of office extended for two more years.

It should be noticed that for the first ever, two ladies became SC Members.

### 6.2 SC Meeting

Three WGs and two TFs finished their work and were disbanded. The WGs and one TF kept an editorial team to finalise their documents to be published as Technical Brochures and Electra papers.

- **WG B1-03** "*Large conductors and composite screens*", (to be published as a technical brochure, a summary paper being published during Spring 2005)
- **WG B1-04** "*Maintenance for HV cables and accessories*" (to be published as a technical brochure, a summary paper being published during Summer 2005)
- **WG B1-05** "*Transients affecting long cables*" (to be published as a technical brochure, a summary paper being published during Spring 2005)
- **TF B1-13** "*Special Bonding of HV cables*". Last year, the work was finished by WG B1-18 on the *power frequency conditions*. To complete the work on this difficult subject, it was decided to launch a one year TF to deal with the *transient conditions*. Both items are now finished and will be published in the same technical brochure by mid 2005.
- **TF B1-16** *Addendum to "Recommendations for tests of power transmission DC cables for a rated voltage up to 800 kV"* (to be published as an Electra paper during Spring 2005).

In 2004, SC B1 launched a Tutorial Advisory Group, four new Working Groups and two Task Forces:

- **TAG (Tutorial Advisory Group)**, permanent, to co-ordinate all activities in the field of education, continuous training, tutorials, publications.
- **WG B1-08** "*Cable systems in multipurpose or shared structures*" which term of office is 2007,
- **WG B1-09** "*Remaining life of existing HV AC underground lines*" which term of office is 2007,
- **WG B1-10** "*Update of Service Experience of HV cable systems*" which term of office is 2007,
- **WG B1-11** "*Upgrading and Uprating of Underground Cable Systems*" which term of office is 2007,
- **TF B1-17** "*Third party damages on Underground cables*" which term of office is 2005,
- **TF B1-18** "*Working gradients and Jointing workmanship on extruded High Voltage cables*" which term of office is 2005,

In addition, SC B1 decided to participate in one JWG, **JWG B3/B1-09** "*Application of long high capacity Gas Insulated Lines in structures*" which term of office is 2007

SC B1 currently has three Advisory Groups, six WGs and two TFs and participates in one JWG.

### **6.3 TC Award**

Kenneth Barber (AU) was honoured with the CIGRE Technical Committee Award 2004 for his contribution to the work of the Study Committee.

## **7 Technical report**

### **7.1 Advisory Groups**

#### **7.1.1 Strategic Advisory Group**

Convener: Reinhard Schroth (Germany)

A permanent Strategic Advisory Group (SAG) was set up in 2002, 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 .

#### **7.1.2 Customer Advisory Group**

Convener: Eugene Bergin (Ireland)

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
  - systematically identify SC B1's Target Groups in different countries
  - listing of respective organizations, persons, social groups, etc.
  - analyzing of organizational levels and hierarchies
  - identifying of most important and influential addressees
2. Communication means with TGs
  - 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
  - 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
  - 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

A questionnaire elaborated by the CAG was circulated during the 2004 Session. The results will help the SC to have a better knowledge of the expectations of the attendance.

### **7.1.3 Tutorial Advisory Group**

*Convener:* Pierre Argaut (France)

A permanent Tutorial Advisory Group was installed in 2004 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:

1. Identification of the potential groups interested in education, continuous training, tutorials or technical presentations
  - 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
  - prepare the structure of appropriate presentations (Paris Session, Tutorials, Symposia, events organised by other learned societies, etc.) in accordance with the CAG
3. Collection of SC presentations
  - 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

## **7.2 Working Groups**

### **7.2.1 WG B1-03 Large conductors and composite screens**

*Convener:* Eric Dorison (France)

WG B1-03 was set up in 2001 and presented its final report in 2004.

The terms of reference are the following:

To elaborate some recommendations for HV and EHV extruded power cables calculation and measurement on:

- AC resistance of large conductor cross section cables,
- Short circuit performance and losses assessment of composite screens.

The WG produced a draft of its final report. As the computation to calculate the AC resistance of large segmental cross-section cables is difficult, the WG investigated the applicability of a formula proposed by K. Sugiyama (JP). The formula was found suitable with insulated copper wires, but with other designs, the IEC approach is recommended using revised values of skin effect and proximity coefficients. It was also recommended to measure the resistance value during the cable type test. A new measuring solution was proposed.

The study on eddy current losses concluded that losses in the bundle of wires in a composite screen must not be calculated as an equivalent sheath as they are negligible.

Their production will be published by Spring 2005.

### **7.2.2 WG B1-04 Maintenance of HVAC underground cables and accessories**

*Convener:* William Boone (The Netherlands)

WG B1-04 was set up in 2001 and presented its final report in 2004.

The terms of reference are the following:

- To define different types of maintenance, in co-ordination with similar work already done within other CIGRE study committees,
- To list technical problems (maintenance issues) in different types of cable and accessories, to specify related detection/repair methods, to compare different approaches and if possible to develop common criteria for decisions (condition assessment tools)
- To collect case studies about how maintenance has been accomplished in practice,
- To indicate how certain maintenance actions can be improved from a technical and from an economical point of view,
- To recommend guidelines for structured maintenance, tailored to the different type of cable/accessory and adjusted to system requirements and to customer needs.

At present, cable system maintenance is mainly corrective and more attention should be focused on preventive maintenance. The report introduced the presently performed maintenance and then gave recommendations and proposed future developments. In particular, the WG considered that more co-operation between utilities is necessary to share experience and knowledge with respect to maintenance.

Their production will be published by mid 2005.

### **7.2.3 WG B1-05 Transients affecting long cables**

*Convener:* Georg Balog (Norway)

WG B1-05 was set up in 2001 and presented its final report in 2004.

The terms of reference are the following:

- To review the literature on the subjects: transients on long cables, experience with long cables, modelling of end terminations. JWG 21/33 has published a paper "Overvoltages in HV AC underground cable systems". This paper should be used in the studies.
- To gather as much utility experience on long cables as possible.
- To define and limit the term "long cable".
- To make recommendations regarding the transient voltage withstand levels for long cables.
- To make recommendations on testing of the system. Some parts may also have to be tested with higher stresses than others.

The task was not easy as the literature on long cables is rather poor and as it is difficult to perform tests on existing lines.

If the maximum internal voltage following a back flashover near the last tower is not at the exposed cable entrance, it is considered that the cable is short. Indeed, when the cable is short, the reflection at the cable end produces an internal voltage which value overpasses the entrance value.

The cable insulation influences this minimum length, from 30 km for a mass impregnated cable to 55 km for an XLPE cable.

If the cable is long enough, the BIL could be reduced up to 30 %, allowing reduction of costs.

Their production will be published by Spring 2005.

#### **7.2.4 WG B1-06 Revision of qualification procedures for underground HV cable systems**

*Convener:* Jean Becker (Belgium)

WG B1-06 was set up in 2002 and is due to present its final report in 2005.

The terms of reference are :

For the range of AC extruded underground cable systems for voltages above 30 kV up to 500 kV, review and complete the qualification procedures for the different HV voltage ranges with the goal to come quickly and economically to the market with innovative solutions but without jeopardising the reliability of the installed system:

- propose tests where there are lacks: e.g. short circuit tests, climatic tests on terminations etc.,
- evaluate whether in high voltage systems up to 150 kV a long term test has to be recommended above given dielectric service stresses or where the innovation is not built on earlier experience,
- define what "earlier experience" means,
- in case of major innovations in EHV cable systems evaluate whether long term tests can be replaced by shorter ones, which should be defined by the WG,

in order to build up a guide of qualification procedures depending on earlier qualification(s) at the same and/or different voltage levels and on field experience.

The WG set up 3 TFs. Their scope could be summarised by what should be done, what has been done and what could be done about the revision of the qualification procedures. It was noticed that the feedback from the breakdowns is lacking. The interest of long term tests for cables systems under 170 kV is discussed but the conclusion is not known yet.

The SC welcomed this very effective group. The WG is due to present its final report in 2005.

#### **7.2.5 WG B1-07 Statistics on underground cable in transmission networks**

*Convener:* Steve Swingler (United Kingdom)

WG B1-07 was set up in 2003 and is due to present its final report in 2006.

The terms of reference are the following:

- To collect statistics for the lengths of underground and overhead circuits at a range of transmission voltages. Only existing lines and projects planned for implementation by 2006 should be included,
- To describe significant underground cable projects realised in the period 1996-2006 giving the reasons why undergrounding was selected,
- To describe the factors which must be considered when evaluating the cost of overhead or underground connections,
- To describe the other factors which must be taken into account in order to make a balanced choice between overhead and underground technology.

It was agreed to exclude submarine cables and DC ones as they are usually submarine, but it will be necessary to explain the main DC land projects.

The voltage range will be above 50 kV limited to transmission levels according to the countries.

The WG will concentrate on cable systems longer than 2 km as shorter cable systems have important fixed costs and may give different conclusions.

Conclusions will be provided according to the voltage range, 50-110 kV and above 110 kV.

### **7.2.6 WG B1-08 Cables systems in multipurpose or shared structures**

*Convener:* Ken Barber (Australia)

WG B1-08 was set up in 2004 and is due to present its final report in 2007.

The terms of reference are the following:

- To establish the appropriate terminology,
- To collect comprehensive information and experience on the use of multipurpose or shared structures for the installation of cable systems. It is anticipated that a comprehensive questionnaire developed by the WG will be necessary. The survey should not be limited to technical aspects such as type of cables, structure design, construction, installation, other infrastructure installed, mutual impacts, maintenance and operational constraints. It should also consider economical aspects, occupational health and safety aspects, administrative aspects, legal aspects and decision-making aspects,
- To collate, summarise and review the information,
- To identify the issues that need to be considered when installing underground cable systems in multipurpose or shared structures,
- To recommend guidelines for the practical application of for the installation of cables.

The scope of work should cover:

- MV, HV, and EHV cables,
- Solid, fluid and gas insulated cables,
- Multi-purpose tunnels and structures shared with pipe services (water including hot or cooled, oil, gas and sewage) and other utilities (other electricity services and telecommunications), Transport services (Roads, Railways and Subways).

There is a low probability of fault on cables installed in tunnels but when it occurred, the impact is high, justifying such a group.

### **7.2.7 WG B1-09 Remaining life of existing HV AC underground lines**

*Convener:* William Boone (The Netherlands)

WG B1-09 was set up in 2004 and is due to present its final report in 2007.

The terms of reference are the following:

- To prepare proper definitions for "End of life/Remaining life"
- To list relevant cable and accessory types,

- To list information to be collected,
- To review relevant ageing mechanisms for paper cable- and extruded cable systems,
- To list defects that contribute to dramatic ageing,
- To review appropriate diagnostic methods,
- To review experience in remaining life estimation (RLE), the techniques used and the success of these techniques,
- To develop a strategy for RLE of paper- and extruded cable systems, based on condition assessment, ageing mechanisms, condition extrapolation to failure for the related cable/accessory types,
- To collect a few case histories,
- To give guidelines for practical application of a strategy for RLE, indicating the accuracy, the effectiveness and the efficiency of applied techniques and methodology.

The scope of work is for voltage over 50 kV:

- Paper cable systems (SCFF and HPFF) for AC application on land,
- Extruded cable systems for AC applications on land,

Remaining life is an important topic, which is much sought by most utilities. It is clear that it won't be possible to exactly say how long the cable system has still to live. To convert the risk of failure, the high cost of operation or the excessive cost of maintenance of a specific line in remaining life estimation will be a first important step ahead. This could be done by giving criteria that lead to replacement.

### **7.2.8 WG B1-10 Update of Service Experience of HV cable systems**

*Convener:* Robert Rosevear (United Kingdom)

WG B1-10 was set up in 2004 and is due to present its final report in 2007.

The SAG identified service experience as a topic which was not addressed since long, as the last figures published by CIGRE regarding underground cables dealt with the experience gained between 1982 and 1986, those regarding accessories for HV cables with extruded insulation dealing with the experience gained up to 1992 and the last figures regarding submarines cables being published in 1986.

The terms of reference will be:

To update up to 2003 existing service experience and previously published information studying at least:

- Technology,
- Laying zone (urban, rural, submarine,...),
- Type of current (AC, DC),
- Internal or external faults,
- Type of cable burial, (protection or not)
- Number of faults per year per mileage,
- Fault duration,
- Repair duration.

#### **Scope of work :**

- The voltage range will be above 50 kV limited to transmission levels according to the countries.
- AC and DC cables,
- Land and submarine cables.

### **7.2.9 WG B1-11 Upgrading and Upgrading of Underground Cable Systems**

WG B1-11 was set up in 2004 and is due to present its final report in 2007.

The difficulties to obtain planning permission for new sites favour the life extension of existing facilities, with the goal of transmitting more power with higher reliability.

The terms of reference will be:

- 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 :**

- AC and DC cables
- Extruded and lapped cables
- Land and submarine cables
- Cooling systems.

### **7.2.10 JWG B3/B1-09 Application of long high capacity Gas Insulated Lines in structures**

*Convener:* Hermann Koch (Germany)

JWG B3/B1-09 was set up in 2004 by SC B3 and is due to present its final report in 2007.

As GIL is in SC B1 scope and as the relative expertise derives mainly from GIS depending on SC B3, it was decided by the CIGRE Technical Committee that this topic will be studied by a JWG led by SC B3.

The terms of reference are:

- To collect information on existing GIL installations in structures
- To identify the issues that need to be considered when installing GIL in specific or shared structures
- To give information how to handle large scale projects and to define what "long GIL" means

The study shall be limited to:

- Mechanical and thermal design,
- Ambient conditions,
- Laying, installation, and gas handling
- Testing, commissioning, and Quality control,
- Repair process,
- Safety risks,
- Life cycle analysis.

As aspects of interactions with other services in multipurpose or shared structures during construction, operation or dismantling are studied by WG B1-08, it is foreseen that this JWG will give relevant technical input about GIL to WG B1-08 and will share information by participating in this group.

## **7.3 Task Forces**

### **7.3.1 TF B1-13 Special bonding of HV cables (Transient conditions)**

*Convener:* Ray Awad (Canada)

TF B1-13 was set up in 2003 and presented its final report in 2004.

In order to complete the work done by WG B1-18 on the power frequency conditions, it was decided in 2003 to set up a one-year Task Force on the transient conditions, which Terms of Reference are:

- Identification and analysis of system electrical transients
- Insulation Coordination Criteria
- Additional Key System design/Application Considerations (multiple circuits, influence of special bonding on adjacent installations etc.)

A lot of calculations with EMTP and ATP programs were done and then analysed. It was expressed that due to a lack of on-site data, it would be difficult to go deeper in the study. The TF proposed simple formulae that gave good results.

The final report, including WG B1-18 work and TF B1-13 one will be published during mid 2005.

### **7.3.2 TF B1-16 Review of “Recommendations for tests of power transmission DC cables for a rated voltage up to 800 kV”**

*Convener: Gunnar Evenset (Norway)*

A document “Recommendations for tests of power transmission DC cables for a rated voltage up to 800 kV” was published by WG 21-02 in Electra No. 189 in April 2000. The experience with testing according to these recommendations was that some problems occurred due to different interpretation by manufacturers and buyers. In the future it will be even more important to be precise in the wording of our test recommendations, as some users may not have any expertise of their own in the field of high voltage DC cables.

To comply with one of CIGRE’s primary objectives, i.e. to meet and satisfy the demands of our different target groups, a task force was therefore established to review the wording in the recommendations published in Electra No. 189.

The task will be limited to the reviewing and further clarifying the recommendations. No additional technical considerations will be made.

An addendum to the “ Recommendations for test of power transmission DC cables for a rated voltage up to 800 kV” was presented at the SC B1 meeting in 2004 and will be published during Spring 2005.

### **7.3.3 TF B1-17 Third party damages on Underground cables**

*Convener: Alain Gille (Belgium)*

Utilities are already suffering for a long time from third party damage of cables, the damage caused to cables from so called external origins (usually digging activities). Compared with the efforts to solve “internal” damage, for instance caused by ageing, third party damage issues are usually treated in an off-hand or unmanaged way, although in terms of money it is a very serious problem.

The TF is due to present in 2005 the Terms of Reference for a potential full WG on the above subject.

### **7.3.4 TF B1-18 Working gradients and Jointing workmanship on extruded High Voltage cables**

*Convener: Kieron Leeburn (South Africa)*

One of the trends in the cable technology is the reduction of the cable insulation thickness and therefore the growing of electrical stress. 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.

The TF is due to present in 2005 the Terms of Reference for a potential full WG on the above subject.

### **7.3.5 JTF SCB1/ICC Interactions between CIGRE SCB1 and IEEE/PES Insulated Conductors Committee**

*Convener:* William Boone (The Netherlands)

This standing JTF was launched in 2000 and should be evaluated in 2005. There is an open communication between ICC and CIGRE on all issues related to HV power cables. Though our relations are very informal, the mutual information and co-operation works well via those experts, who are at the same time members in both organisations. The relations are good and it is important for both parties to get mutual information.

The present activities are:

- Exchange of technical information,
- Cooperation/coordination between WGs on similar activities: Installation and operation of cables in pipe lines, Cross bonding, PD field testing, Condition Assessment, Maintenance, Replacement,
- A page related to SC B1 is on the ICC web site.

The proposed activities for the future are:

- Continuation of process of exchange of technical information and cooperation,
- To exchange information on the activities of CAG,
- To create an ICC page on the CIGRE web site,
- To consider a joint seminar