

CIGRE Study Committee B1 Insulated Cables

Fredrik Rüter, SC B1 Chairman

www.cigre.org

www.cigre-b1.org





CIGRE facts

- created 1921
- non governmental
- worldwide > 80 countries
- 4200 individual members
- 900 collective members
- all sectors of the Electric Power Industry represented



CIGRE objectives

- Facilitate and develop the exchange of engineering knowledge and information
- Add value to the knowledge and information exchanged
- Provide technical reports and recommendations



CIGRE technical library:

- all official documents available on the CIGRE web-site
- free download of documents for CIGRE members available end 2006
 - all CIGRE documents will be digitalized
 - full catalogue and search engine under preparation

CIGRE Symposia:

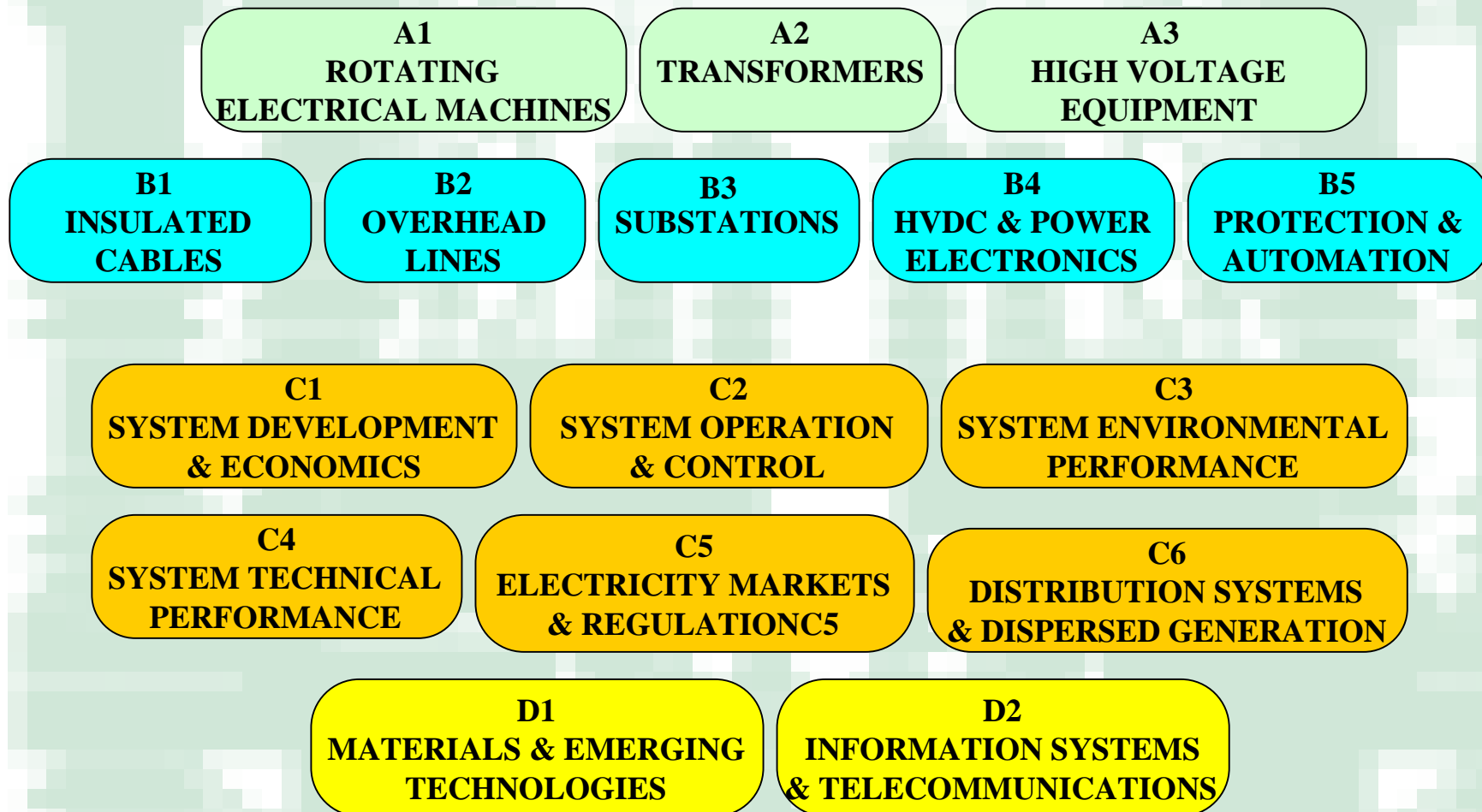
- short presentation of papers by authors
- then discussion with attendees

CIGRE Tutorials:

- are owned by CIGRE
- are within the responsibility of the SC
- can be presented by a CIGRE member, (e.g. on the occasion of a WG meeting)



Study Committees of CIGRE





STUDY COMMITTEE SC B1 "Insulated Cables" (formerly SC 21 "HV Insulated Cables")

Field of activity

Land and submarine insulated cable systems
for AC and DC transmission

Scope of work

Theory, design, manufacture, testing, installation, application,
operation, maintenance and diagnostic techniques

SC B1 Facts

Founded in 1927

2006: Chairman (Fredrik Rüter, SE), Secretary (Yves Maugain, FR)

24 regular members, 12 observer members.

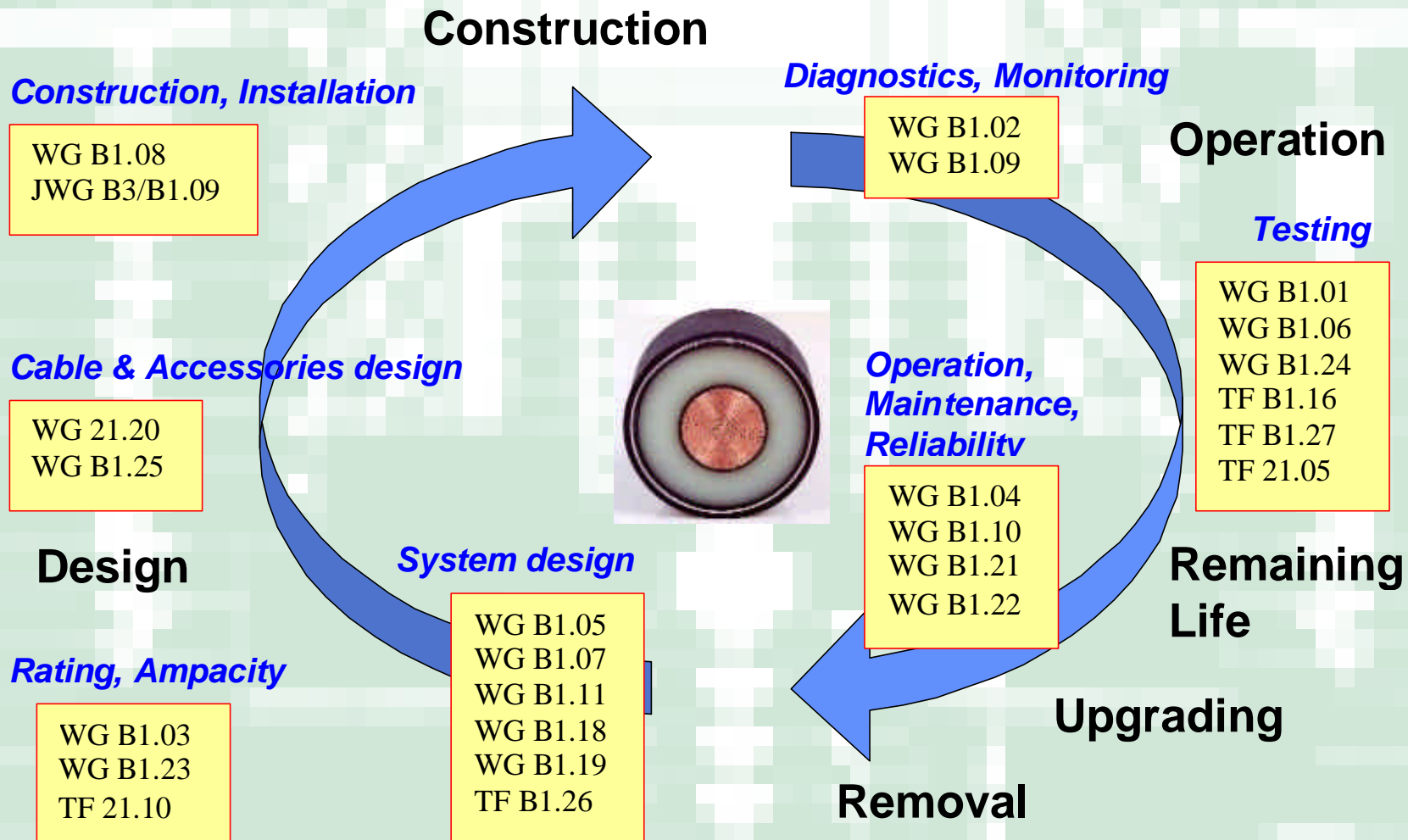
sector distribution:

17 from utilities, 13 from manufacturers,

8 from universities/institutes



SC B1 Fields of Activity





Summary of Strategic Plan

- Safeguarding technical competence
- Extruded cables technology
- Cables operation and testing
- The operational environment
- Satisfying customers (Target Groups)
- Maintaining good relations to partners
- Liaison with IEC TC20
- Active participation in Jicable



From SC B1 Strategic Plan

Safeguarding technical competence

- keep outstanding experts involved as active members
- encourage young engineers to participate
- attract new Observer Members
- produce high-quality results for publication in synthesizing documents, symposia, tutorials



From SC B1 Strategic Plan

Extruded cables technology

- monitor the development and performance of HV and EHV extruded AC cable systems
- keep attention on increased application and performance of extruded DC cables
- study the development and implications of innovative cable materials in co-operation with CIGRE SC D1



From SC B1 Strategic Plan

Cables operation and testing

- study ageing mechanisms, diagnostics tools and condition assessment methods
- support systems on-line operational management, monitoring systems and maintenance strategies
- update, when appropriate, test procedures for HV and EHV cable systems in the light of growing service experience



From SC B1 Strategic Plan

The operational environment

- monitor the evolution of world-wide practices of HV/EHV cable systems in the light of a more widespread presence of underground cables in the network
- study the prime service features of HV/EHV cable systems with emphasis not only on technical, but also on operational, economical and environmental aspects
- contribute to the competitiveness of underground cable systems compared to other solutions



From SC B1 Strategic Plan

Satisfying customers (Target Groups)

- analyse, map and review needs of TGs
- promote SC B1 members as local interfaces to TGs
- develop, when needed, non-technical competence
- make decision-makers in the EPI aware of our work



From SC B1 Strategic Plan

Maintaining good relations to partners

- interact effectively with other CIGRE SCs
- maintain close co-operation with IEC TC20
- participate in Jicable
- strengthen and intensify links with IEEE PES/ICC
- develop, when appropriate, relations to CIRED



Liaison with IEC TC20

- TC20 representative invited to all SC B1 meetings, to observe and to speak
- Specific Work identified by TC20, can be launched as “preparatory” within SC B1
- No permanent liaison group



Participation in Jicable 2007

Jicable International Conferences are important forum and meeting place for international cable experts

Session Chairmen and Rapporteurs, app 20 "from CIGRE SC B1"

Solid CIGRE SC B1 representation in Jicable "International Scientific and Technical Committee"



SC B1 Publications from 2002 onward

Year	TB No	Title
2002	210	Interfaces between HV extruded cables and accessories
2002	211	Preparation of guidelines for collection and handling of reliability data
2003	218	Gas Insulated Lines
2003	219	Testing DC extruded cable systems for Power Transmission up to 250 kV
2003	229	High Temperature Superconducting Cable systems
2004	247	Optimization of power transmission capability of underground cable systems using thermal monitoring
2004	250	Technical and environmental issues regarding the integration of a new HV underground cable system in the network
2005	268	Transients affecting long cables
2005	272	Large conductors and composite screens
2005	279	Maintenance of HVAC underground cable and accessories
2005	283	Special bonding of HV cables
2006	303	Revision of qualification procedures for HV and EHV AC extruded underground cable systems



Operating structures of SC B1

- Advisory Groups (**AGs**) consider strategic items
- Working Groups (**WGs**) (3 to 4 years) are the basic operating bodies
- Ad hoc Task Forces (**TFs**) (1 year) are preparing the Scope/Terms of Reference for new WGs
- Task Forces may also be set up on specific topics or as part of a WG



Present structure of SC B1:

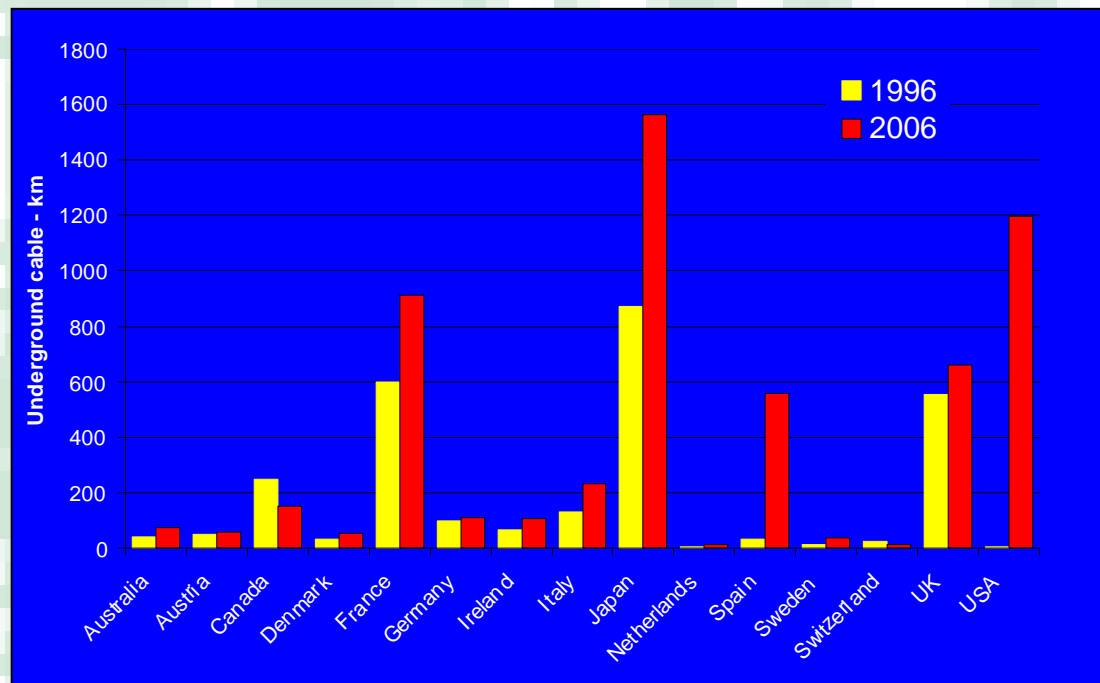
- three Advisory Groups (AG)
- ten Working Groups (WG)
- two Joint Working Bodies (JWG/JTF)
- two Task Forces (TF)



SC B1 Active Working Bodies:

WG B1.07: Statistics on underground cable in transmission networks (2003 - 2006)

Example: Use of Extruded Cables



To be published in 2007



SC B1 Active Working Bodies:

WG B1.08: Cable systems in multipurpose or shared structures (2004 - 2007)

Investigate all aspects related to the co-existence of cable transmission systems and other installations in the same structure i.e. railway and motorway tunnels, subways, bridges, gas, water and sewage supplies etc. for the simultaneous installation of electrical power transmission systems





SC B1 Active Working Bodies:

WG B1.09: Remaining life of existing HV AC underground lines (2004 - 2007)

AC Cables > 50 kV (both paper- and extruded) for land installations

Highly interesting
Very complex

A combination of balanced technical, economical and strategical considerations to give guidance to an effective Remaining Life Management.



SC B1 Active Working Bodies:

WG B1.10: Update of Service experience on underground and submarine cables (2004 – 2007)

- Previous Cigré similar compilation was in 1986.
- Failure statistics and operational life times.
- Many would appreciate public data.
- Challenging to get data from utilities.



SC B1 Active Working Bodies:

WG B1.11: Upgrading and uprating of existing cable systems (2004 – 2007)

- To review the literature on similar subjects (IEC, CIGRE, IEEE publication),
- To establish the appropriate terminology,
- To inventory the possible technical solutions for increasing a specific performance of an existing cable system, extending its life duration, and improving environmental behaviour and safety,
- 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 or flowchart approach, and illustrations with practical cases.



SC B1 Active Working Bodies:

WG B1.21: Third party damages on underground and submarine cables (2005 – 2008)

- To give guidance to all relevant parties involved (cable owners, utilities dealing with electricity, contractors, authorities, other utilities)
- To define the right terminology
- To collect information worldwide about third party damage failure statistics
- To collect information about main “damagers”, the most sensitive areas and the most “dangerous” civil works techniques.



SC B1 Active Working Bodies:

WG B1.22: Cable accessories workmanship (2005 – 2008)

- To review available literature
- To complete terminology
- To prepare a simple guide for non-technically oriented customers
- To prepare guidelines for training of jointers.



SC B1 Active Working Bodies:

WG B1.23: Impact of EMF on current ratings and cable systems (2006 – 2009)

- Summarize available field management techniques
- Synthesis of practical field management methods installed or planned worldwide.
- Provide shielding ratios for practical installations with reference to values attained in built systems, minimum achievable under worst case conditions and maximum practical feasible.
- Provide assessment of design and construction considerations for practical installations.
- Compare different existing or new field management methods with respect to their relative cost effectiveness.
- Provide calculation methods for de-rating of cable systems fitted with field management assemblies.
- Provide case studies for practical electro-magnetic field management applications and its specific considerations for design, cost and rating impact.



SC B1 Active Working Bodies:

WG B1.24: Test procedures for HV transition joint (2006 – 2009)

- 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
- To propose test regimes for transition joints and their associated cables. Type, routine, sample and after-laying tests should be considered
- The WG should take into account ac cables and accessories for rated voltages above 30 kV up to 500 kV.
- Submarine and DC systems should be excluded.



SC B1 Active Working Bodies:

WG B1.25: Advanced design of laminated metallic foils (2006 – 2009)

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.

- To issue a Guide to Use including cable length, installation type, environment, electrical connection scheme.
- Extruded AC land cable systems only with a focus above 36kV



SC B1 Active Working Bodies:

TF B1.26: Earth potential rises in specially bonded screen systems (2005 – 2007)

To improve the design of special bonded screen systems, dealing with EPR, providing :

- more information on EPR which may occur during single phase to earth faults
- details of a calculation method based on the Complex Impedance Model.
- calculation examples for typical situations.



SC B1 Active Working Bodies:

TF B1.27: Test recommendations on XLPE AC submarine cables from 170 kV to 500 kV (2006 – 2007)

- The Task Force will evaluate need, and propose Terms of Reference for future work.
- Background: there is now a 400 kV HVAC XLPE submarine link installed.



SC B1 Active Working Bodies:

JWG B3/B1.09: GIL in tunnels (2004 – 2007)

- To collect information on existing GIL installations
- 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.



SC B1 Active Working Bodies:

JTF SC B1/ICC:

Interactions between CIGRE SC B1 and IEEE/PES/ICC

A permanent Liaison Group



SC B1 Active Working Bodies:

Strategic Advisory Group SC B1 SAG

➤ Scope:

- to assist the chairman in the definition of strategic directions
- to suggest, if appropriate, new work items

➤ Composition and duration:

- limited number of selected members
- permanent duration



SC B1 Active Working Bodies:

Customer Advisory Group SC B1 CAG

- **Scope:**
 - develop communication links to customers/
target groups (TGs)
 - analyze, map and review the needs of customers

- **Composition and duration:**
 - one member from each continent
 - permanent duration



SC B1 Active Working Bodies:

Tutorial Advisory Group SC B1 TAG

➤ Scope:

- identify tutorial target groups
- prepare means for dissemination of SC B1 knowledge
- produce tutorial presentations (from each WG)

➤ Composition and duration:

- members with communication talents
- permanent duration

SC B1 Meeting + Symposium 2007 in Osaka

SC B1 Meeting Oct 29 – 31 2007 (for members)

Joint Symposium Nov 1 – 4 2007 (open to registr.)

“System Development and
Asset Management Under Restructuring”

C1 (System Dev't and Economics)

B1 (Insulated Cables)

B4 (HVDC and Power Electronics)

C5 (Electricity Markets and Regulation)

