



CONSEIL INTERNATIONAL DES GRANDS RESEAUX ELECTRIQUES  
INTERNATIONAL COUNCIL ON LARGE ELECTRIC SYSTEMS

## STUDY COMMITTEE A2 TRANSFORMERS

### **Presentation of CIGRE activities on Power Transformers**

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**Chairman SC A2 'Transformer'**

**January 2010**

# Presentation of CIGRE

## **CIGRE aims to :**

- Facilitate and develop the exchange of engineering knowledge and information, between engineering personnel and technical specialists in all countries as regards generation and high voltage transmission of electricity
- Add value to the knowledge and information by synthesizing state-of-the-art and world practices
- Make managers, decision-makers and regulators aware of CIGRE's work

16 Study Committees

Exchanges with partners of CIGRE ( IEC; Eurelectric, IEEE, CIRED, ... )

# CIGRE SC Organization

A1 Rotating electrical machines

A2 Transformer

A3 High voltage equipment

B1 Insulated cables

B2 Overhead lines

B3 Substations

B4 HVDC and power electronics

B5 Protection and automation

C1 System development and economics

C2 System operation and control

C3 System environmental performance

C4 System technical performance

C5 Electricity markets and regulations

C6 Distribution systems and dispersed generation

D 1 Materials and test techniques

D 2 Information systems and telecommunication

# The Transformer Committee (A2)

**Scope** : Design, construction, manufacture and operation for all kinds of power transformers, including industrial , DC converters and phase-shift transformers and for all types of reactors and transformer components (bushing, tap-changer...)

**In the past** ( *known as SC12* ) activities were focused on design problems related to the rapid increase of rated voltage and power

**Today**, the two Strategic Directions for A2 future activities are :

- **Services to Customers** ( Reliability, Life management, Economics, Tutorials, ...)
- **Technology Issues** (Safety, New technologies and New concepts, Electrical environment, Pre-standardization work, ...)

## Present A2 Activities

- 24 regular members
- 16 observer members
- + 162 experts involved in 9 WG's
- 7 AG's
- 13 Liaisons with other working bodies
- 40 countries represented

# Recent CIGRE BROCHURES

<i>Scope</i>	<i>Ref</i>	<i>Year</i>
Thermal aspects	96	1995
Static electrification	170	2000
Effect of particles	157	2000
Customer specifications	156	2000
Design reviews	204	2002
Short circuit performance	209	2002
Life management of transformers	227	2003
Economics of Transformer Management	248	2004
Transformer Lifetime Data Management	298	2006

%

## Recent CIGRE BROCHURES (cont.)

<i>Scope</i>	<i>Ref</i>	<i>Year</i>
Mechanical Condition Assessment of Transformer Windings	342	2008
Recommendations for Condition Monitoring and Condition Assessment Facilities for Transformers	343	2008
Moisture Equilibrium and Moisture Migration within Transformer Insulation Systems	349	2008
Copper Sulphide in Transformer Insulation	378	2009
Thermal performances	393	2009
HVDC Converter Transformers - Test procedures, ageing evaluation and reliability in service	406	2010
HVDC Converter Transformers – Guidelines for design review	407	2010

**see also brochures issued by SC D1, resp. WG D1-01**

# Past SC A2 Sessions & Colloquium

- 2006 Paris*
- *Transformers Reliability, Technical, Economical and Strategical Aspects*
  - *New Development of electrical transients on transformer performances*
  - *Phase-Shifter Transformers*
- 2007 Bruges*
- *Guidance in new insulation liquids for improvement on performance and reliability*
  - *Life estimation of transformers in service*
  - *Reactors and related items*
- 2008 Paris*
- *Performance in service of new insulation systems for transformers*
  - *Reliability and risk assessment of transformers in service*
  - *Reactors (shunt, shunt with regulation, series, neutral) and related items*
- 2009 Capetown*
- *Transformer incidents in service*
  - *Transformer Life*
  - *Transformer Modeling*

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# Present A2 Activities

## **WG finishing editorial :**

**WG A2.34 Guide on maintenance**

**WG A2.35 Experiences with new liquids**

**Rajotte (CA)**

**Martin (UK)**

## **WG underway :**

**WG A2.33 Aspects related to Fire Safety**

**WG A2.36 Guide for Transformer Procurement Process**

**WG A2.37 Transformer Reliability Survey**

**WG A2.38 Temperature Modelling**

**JWG A2/C4.39 Electrical Transient Interaction between Transformer  
and the Power System**

**WG A2.40 Copper sulphide long-term mitigation and risk assessment**

**WG A2.42 Guide on Transformer Transportation**

**Petersen (AU)**

**Breckenridge (UK)**

**Tenbohlen (DE)**

**Lapworth (UK)**

**Rocha (BR)**

**Lukic (RS)**

**Mjelve (NO)**

## **New Working bodies in preparation :**

- **Reactor**
- **Oil conductivity under DC condition**
- **Requirement for transformer tank**
- **Contingency of transformer practices, standardization**
- **Short circuit capability in the context of transformer ageing**
- ...

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# Present A2 Activities (cont.)

**Liaisons with other Study Committee or external bodies:**

- **IEC TC 10**
- **IEC TC 14**
- **IEEE**
  
- **WG D1.01 – Liquid Impregnated systems for transformers**
- **TF D1.01.13 - Furans for diagnostic**
- **TF D1.01.15 - Progress in DGA technique**
- **TF D1.01.16 – Dielectric Performance of Liquids**
  
- **TF D1.01.17 - Oxidation Stability of Transformer Insulating Oils**
- **WG D1.24 - Polymer Nanocomposites**
- **WG D1.15 - HTSC-Material Applications & Cooling**
- **WG A3.22 - Technical requirements for s-station equipment exceeding 800 kV**
- **WG B3.22 - Technical requirements for s-station exceeding 800 kV**
- **WG C4.306 - Insulation Coordination of UHV AC Systems**

# CIGRE A2 TUTORIAL ACTIVITIES

- Objectives
  - Capture the knowledge and know-how developed by CIGRE SC A2 and other related SC and disseminate
  - Add value to this knowledge and information by synthesizing state-of-the-art documents
  - Improve visibility of recent development in transformer related topics
  - Identify the research that appear most promising
  - Disseminate at the regional level to reach a larger audience

# CIGRE A2 TUTORIAL ACTIVITIES (cont.)

- List of Tutorials
  - Transformer Overload Performance
  - Short Circuit Performance
  - Economics of Transformer Management
  - Copper sulphide in power transformer insulation
  - Recommendations for condition monitoring and condition assessment facilities for transformers
  - Transformer lifetime data management
  - UHVDC Convert Transformers: Reliability Aspects
  - Moisture Equilibrium and Moisture Migration within Transformer Insulation Systems
- Tutorials prepared by SC D1, resp. WG D1-01
  - Partial discharge application
  - Diagnostics of oil-paper insulation by means of dielectric response methods
  - Ageing of cellulose insulation in transformers

# A2 Tutorial & External Events

- **6th Southern Africa Regional Conf. - with the support of SC A2, A3 and B3, Somerset West, South-Africa, August 2009**
- **Int. Electrical Transformer Forum – Beijing /China – September 2009**
- **Colloquium ‘Transformer Research and Asset Management’, Cavtat, Croatia, November 2009**
- **Transformers Seminar, CIGRE Israel, Herzliya, Dec 8-9, 2009**
- **TRAFOTECH-2010 Eighth Int. Conf. on Transformers - Mumbai/India - January 2010**
- **VI WORKSPOT - International Workshop on Power Transformers - Foz de Iguaçu / Brazil, April 2010**
- **CMD 2010 - Modern Asset Management Technology for Green Operation – September 6 - 11, 2010 - Tokyo, Japan**
- **Transformer Application, Diagnostic, Maintenance and Extension of their Lifetime (Dedicated to the 70th anniversary of V. Sokolov's Birth) - September, 13 – 17 2010 – Ekaterinburg, Russia**

## Next SC A2 Events

- **2010 – Paris - August 25**
  - **Check the report of special reporter(s) which will be posted on CIGRE WEB site after March 2010.**
  - **Answer only the questions raised in this report**
  - **Send your ‘prepared contribution’ 2 weeks in advance to SC A2 secretariat**
  - **spontaneous contribution from the floor will be possible, but only with an access to the microphone (no charts)**
    - **Goal -> to reduce the number of contributions in order to allow more discussion**

*Thank you for supporting A2*



see [www.cigre-a2.org](http://www.cigre-a2.org)