



## 2014 Activity Report

### Study Committee A2

#### 1. Highlights

- One WG was completed: JWG A2/C4.39 "Electrical Interaction between transformer and the power system" and published two brochures: #577A - Part 1 Expertise; #577B - Part 2 Case studies
- Two new JWG started: JWG A2/D1.51 "Improvement to Partial Discharge Measurements for Factory and Site Acceptance Tests of Power Transformers" and JWG A2/C4.52 "High-frequency transformer models for non-standard waveforms"
- Ten WG and four JWG are currently running within SC A2: WG A2.37, WG A2.38, WG A2.40, JWG A2/D1.41, WG A2.42, WG A2.43, WG A2.44, WG A2.45, JWG A2/D1.46, WG A2.48, WG A2.49, WG A2.50, JWG A2/D1.51 and JWG A2/C4.52.
- Continuation to the inventory of SC A2 member expertise by the use of mini-cv
- Maintenance of a library of all the Colloquium Publications held in the last 18 years
- One additional "short position paper" was published by SC A2 on selected subjects to improve website content

#### 2. Working group changes since the last TC meeting

##### 2.1 New WG

During year 2014, two new ToR were started: JWG A2/D1.51 on "Improvement to Partial Discharge Measurements for Factory and Site Acceptance Tests of Power Transformers" and WG A2.52 on "High-frequency transformer models for non-standard waveforms". These two WG scope include:

JWG A2/D1.51 "Improvement to Partial Discharge Measurements for Factory and Site Acceptance Tests of Power Transformers" (S. Coenen / DE)

- Review and compare available publications about detection of PD in transformers
- Investigate the emission spectrum of different types of PD in oil, attenuation and signal quality
- Sensitivity compare with other methods and sensitivity check (calibration)
- Make recommendations about sensor characteristics, sensor placement, frequency ranges and signal amplification, PD detection and localization, factory acceptance tests and site acceptance tests

WG A2.52 "High-frequency transformer models for non-standard waveforms" (B. Gustavsen / NO)

- Provide guidelines and recommendations for the generation of transformer models for simulation of high-frequency transient overvoltages that can occur in actual service.
- Define minimum requirements that models supplied by manufacturers to customers must comply with for including the transformer model in network studies.
- Describe the different techniques for modelisation as white-box, black-box and grey-box models.
- Provide benchmark examples of models applied in simulation of transformer-network transient interactions using white-box and black-box models.



## 2014 Activity Report

### 2.2 WG Disbanded

- One WG was disbanded: JWG A2/C4.39 "Electrical Interaction between transformer and the power system"

### 2.3 Number of active groups

- Ten WG and four JWG are currently running within SC A2: WG A2.37, WG A2.38, WG A2.40, JWG A2/D1.41, WG A2.42, WG A2.43, WG A2.44, WG A2.45, JWG A2/D1.46, WG A2.48, WG A2.49, WG A2.50, JWG A2/D1.51 and JWG A2/C4.52.
- In addition, another group named JWG D1/A2.47 is under the hat SC D1.
- Several other subjects for Working Groups are currently under discussions, in particular "Objective interpretation methodology for the mechanical condition assessment of transformer windings using Frequency Response Analysis (FRA)", "Transformer Noise" and "Transformer Life Extension".

### 2.4 Allocation of WG to the 4 TC strategic directions

The following table shows the relation of the SC A2 Working Groups with the TC Strategic directions (the last two WG are under approval by TC):

WG	Title of the WG	Strategic dir.*
A2-37	Transformer Reliability Survey	2,3,4
A2.38	Transformer Thermal Modelling	2
A2.40	Copper sulphide long-term mitigation and risk assessment	2
A2/D1.41	Oil conductivity under DC condition	1,2
A2.42	Guide on Transformer Transportation	1,2
A2.43	Transformer bushings reliability	2,3
A2.44	Transformer Intelligent Condition Monitoring	1,2,4
A2.45	Transformer failure investigation and post-mortem analysis	2,3
A2/D1.46	Field experience with transformer solid insulating ageing markers	2,3
A2.48	Technology and utilization of Oil Insulated HV Shunt Reactors"	1,2,3
A2.49	Condition Assessment of Power Transformers	2
A2.50	Effect of the distributed energy sources and consequent induced reverse power flow (step up) on transmission and distribution transformers	1,2,3
A2/D1.51	"Improvement to Partial Discharge Measurements for Factory and Site Acceptance Tests of Power Transformers"	2
A2.52	High-frequency transformer models for non-standard waveforms"	1,2

\* Strategic Directions: indicate the main strategic direction, or the two main directions if needed

- 1 : The future power system
- 2 : Best use of the existing power system
- 3 : Environment and sustainability
- 4 : Communication with the public and with political decision makers

## 3. Publications

### 3.1 Publications since the last TC meeting (April 2010)

The following publications have been prepared by SC A2 since the last TC:

- #577A: "Electrical Interaction between transformer and the power system – P1 Expertise
- #577B "Electrical Interaction between transformer and the power system – P2 Case Studies"
- WG A2/C4.39-Publication in Electra in April 2014



## 2014 Activity Report

### 3.2 Publication plan for the coming year

In the coming year, the following documents are planned to be published by SCA2:

- Annual report on SC A2 activities in Electra (June)
- Brochure and Electra Paper for WG A2.37 Reliability Surveys
- Brochure and Electra Paper for WG A2.38 Transformer Thermal Modelling
- Brochure and Electra Paper for WG A2.40 Copper sulphide long-term mitigation
- Brochure and Electra Paper for WG A2.42 Guide on transformer transportation
- Brochure and Electra Paper for WG A2.44 Transformer Intelligent Monitoring

### 4. Tutorials and workshops in 2014

International Conference on Best Practice in Operation and maintenance of EHV Transmission Assets 2014, New Delhi, India:

- Guide on transformer maintenance
- Frequency Response Analysis of Transformers

Workspot 2014, Rio de Janeiro 2014:

- Guide on transformer maintenance
- Frequency Response Analysis of Transformers

IEEE Transformer Meeting 2014, Savannah (GE), USA,

- Electrical Interaction between transformer and the power system

### 5. Strategic Plan and Action Plan

An updated version of the Strategic Plan 2010-2016 is available on the SC A2 website

### 6. Planned SC meetings

- 2015: September 24<sup>th</sup> during the SC A2 Colloquium in Shanghai, China
- 2016: August 24<sup>th</sup> in Paris during the CIGRE Paris Session

### 7. Participation to Regional Meetings, colloquia and symposia :

- Techcon North America, February 4-6<sup>th</sup>, Phoenix AZ, United States of America
- UHV Colloquium, New Delhi, India
- Workspot 2014, Rio de Janeiro 2014:

### 8. Relations with other organisations

Strong relation with IEC TC14 and IEEE Transformer Committee



## 2014 Activity Report

### 9. Specific actions for the recruitment of young experts, Place of Women in the SC

#### 9.1 Young Experts

All WG and JWG Convenors are invited to promote the participation of young experts. All WG have at least one young expert in their WG.

#### 9.2 Place of women in the SC

In 2014, SC A2 has three women covenor of WG/JWG. Moreover, at the last colloquium A2/C4, two women as chairman and one woman as keynote speaker. Finally, during the same colloquium, 10% of registered participants were women (10% of 250 participants)

### 10 SC website : on-line contents and date of last update

The SC A2 website is updated regularly and reflects the current structure and progress of the SC work forces. The content is typically updated at least every month.

In order to improve the SC A2 website technical content, a new concept was introduced to prepare short position papers for subjects of interest identified. Selected experts are requested to prepare short reports on these subjects. These short reports are approved by SC A2 and become the "opinion of SC A2 experts". SC A2 website currently contents four short position papers.

### 11 Miscellaneous

Pierre Boss, former Chairman of SC A2, is the SC A2 Communication Officer. His role is to collaborate with the SC A2 chairman to ensure the quality of the publications released by the SC and to ensure that the content of the brochure is consistent with the values and directions of CIGRÉ.

SC A2 took the initiative to ask to all SC members to prepare a short CV available to all other members. This initiative helps the chairman and secretary to know the competence and experience of each member, helps members to know each other and is helpful to facilitate the integration of new SC members.

SC A2 has created a library that contents the publication of colloquium held during the last 18 years: 1997 (Sydney), 1999 (Budapest), 2001 (Dublin), 2003 (Mérida), 2005 (Moscow), 2007 (Bruges), 2009 (Cape Town), 2011 (Kyoto) and 2013 (Zurich).

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