



2006 PROGRESS REPORT

STUDY COMMITTEE A2 (Transformers)

1. Highlights

SC A2 WEB site is fully implemented. The scanning of colloquium's paper in view of a preparation of a library of relevant papers on transformers has started. Permanent and close relations established between WG D1-01 and SC A2 are existing. An important work to support the branch of transformers industry, related with the lack of reliability dues to the corrosivity of some oils, has taken place. Important activities in the field of tutorial continue to be implemented with coverage of new domains.

2. Status of SC reference model implementation

SC A2 has fully implemented the reference model for SC (see strategic plan on the WEB site of A2).

3. Main technical directions pursued

The two strategic directions of SC A2 have not been changed and are:

- To continue on transformer technology issues and to consider new information technologies (data, communication, web services ...)
- To provide services to CIGRE customers (reliability and availability including impact of accessories, life management, economical issues, tutorials, etc).

4. SC WG & TF

Full progress report, scope and membership of the different groups are on the WEB site of A2

4.1 Working groups disbanded or transferred to an other SC

JWG A2/A3/B3-21 – Electrical environment of transformers (M. Glinkowski) has been disbanded after publication of his report in Electra N° 218 dated Feb 2005.

4.2 Activities of WG or TF

WG A2-23 - Lifetime data management for transformers (N. Fantana) has sent his final report to SC A2 chairman for further actions. SC A2 chairman proposes to issue a CIGRE guide. This report has been sent to SC B3 and D2 for information as the domain of "data management" may needs some special coordination. Depending of the opinions of these two SC's, the final report will be put only on the WEB site of A2 for an access for the public. WG A2-23 will be disbanded after the final publication, hopefully at the next SC meeting. SC A2 invites other SC's to work in the direction of "Data Management". If needed SC A2 will joint further actions. It is interesting to note that WG A2-23 was working closely with the local CIGRE Team from Brasil dealing with the same topics. The team in Brasil is continuing his work and SC A2 will stay in contact with this team.

WG A2-24 - Thermal performances (J. Declerq) created in 2003. The WG is considering : fundamentals of thermal ageing of insulation system, thermal modeling of transformers (for monitoring system) and thermal testing of transformers (contribution to measuring uncertainties at heat run tests).

WG A2-25 - Bushing reliability (G. Polovick) created in 2003. The aim of the WG was to improve the bushing reliability or at least to prevent the decrease of the bushing performance (trend due to economic pressure) the long term impact of which can be catastrophic for the transformer reliability. The WG does not show progresses. The problematic of reliability of bushings shall be discussed during the next SC meeting before to disband probably this WG.

WG A2-26 - Mechanical condition assessment of transformer windings (P. Picher) created in 2003. The WG prepares a guide with an introduction to the basic of FRA application, a comparison of different measuring techniques available on the market and finally on interpretation guidelines. The WG is working in close liaison with experts from D1.33. An intermediate report in Electra will be issued at the end of 2006.



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WG A2-27 - Recommendations for condition monitoring facilities (P. Jarman) created as TF in 2003 and as WG in 2005. The review of existing and developing condition monitoring systems and practices to determine the range of sensors employed has been completed. A definite pattern and commonality to the requirements of the diverse monitoring systems has emerged. On the basis of that the second task to determine whether standardization could improve the market for or implementation of, condition monitoring systems, sensors or techniques has been also completed. The consensus is that it would be helpful to manufacturers of both complete systems and sensors to have some standardisation of the interface with the transformer. The potential benefit to utilities is clear in terms of improved efficiency of retrofitting and interoperability of different systems and sensors. ISO TC108 SC 5 has a WG10 concentrated condition monitoring and diagnostics of electrical equipment and this includes rotating electrical techniques, particularly motors, but there is a desire to include transformers in the remit. The work of CIGRE, particularly that of Working Group A2.27 "Facilities for condition monitoring" and the IEEE was brought to the attention of the convenor of WG10. It is likely that the work at ISO on transformers will be deferred at least until CIGRE A2-27 has published its findings and IEC TC14 has decided if it wishes to pursue any activity in this area. The convenor of CIGRE WG A2-27 attended the plenary session of TC 108 SC5 in London on 25th October 2004 and the sixth meeting of WG10 on the same date.

TF A2-29 - Reliability Survey (K. Ryen) created in 2004 to prepare a reliability survey in conjunction with A3/B3. The main objective was to check the format of the survey prepared by A3/B3. As the survey A3/B3 has already be issued, no formal activity in the field of "Reliability" has been undertaken. Nevertheless SC A2 has established a close relation with A3/B3 in that domain. Finally a report prepared by the AG "Reliability" has been sent to Electra for publication before Aug 2006. The reliability is one of the PS in 2006. Before to disband probably this WG, a discussion shall take place during the next SC (see also comments on WG A2-25 above).

TF A2.30 - Moisture in transformer (V. Sokolov) created in 2004. This TF shall prepare a report (brochure) on moisture in transformers to support the understanding of moisture mechanism in transformer.

4.3 New working Groups and Task Force

TF A2.31 - Influence of particules or contaminants in oil on the transformer performances (M. Dahlund) created in 2005. This TF has been created to look on a questionnaire put in circulation within the circle of A2 members and to propose a status report and an action plan in the field of the effect of oil corrosivity and other related problems. A report has been sent to Electra for a publication in the issue from February 2006. In addition an action plan has been sent to SC A2 for further considerations. TF A2-31 has been disbanded in November 2005. The new action plan will be considered within WG A2-32.

WG A2-32 - Copper sulphide in power transformer insulation (M. Dahlund) created in 2005. The WG is splitted presently in two sub-tasks: a) Test and specification and b) "Metal passivator long term stability study". IEC TC 10 has created the WG 35 to work in close relation with CIGRE WG A2-32 for the revision of IEC 60296 and 60422. It is planned that WG A-32 shall propose the terms for revision to IEC 10 WG 35 before mid 2006.

5. Joint WG & TF

5.1 Joint working Groups

JWG A2/B4-28 - HVDC Converter Transformers (M. Saravolac) created in 2004. A need to set up a task force to address specifications for HVDC transformers which fully takes into account interaction with converter valves. The TF will prepare a proposal for inclusion in HVDC transformer specification. Once the requirements are defined, the necessary design verification method and criteria will be looked at, as well as special test requirement if feasible. Results of TF to be expected at the end of 2007. In addition the WG is looking at the suitability of current international (IEC/IEEE) standards for converter transformers, at is the test requirement regarding DC polarity reversal for 3 winding converter transformers and at the consequential effect of increased voltage and current ratings on DC bias especially in relation with 800 kV HVDC systems.



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5.2 Activities with other Study Committee

- WG D1-01: Impregnated insulation (L. Lundgaard / NO)
- TF D1-01-10: Paper Ageing (L.Lundgaard / NO)
- TF D1-01-12: Oil maintenance - Insulating oil reclamation and and dechlorination (B. Pahlavanpour / UK)
- TF D1-01-13: Furans for diagnostics (Marie-Claude Lessard / CA)
- TF D1-01-14: Dielectric response diagnoses for transformer windings (S. Gubanski / SE).
- TF D1-01-15: Progress in DGA techniques and diagnoses (M.Duval / CA)
- TF D1-01-16: Dielectric Performance of insulating liquids for transformers (tbn)
- WG C1-10: CIGRE Glossary (A. Popescu /RO) & W. Reinke / US)
- WG B3-12: Obtaining value from Substation Condition Monitoring

6. SC Publications and publication plan

- Report of JWG A2/A3/B3.21 “Electrical environment of transformers” – Electra N° 218 - February 2005
- Publication summarizing the 2004 Conf. organised by CIGRE Greece and the support of SC’s A2 and D1 - Electra N° 220. - June 2005
- Short report on SC A2 Colloquium - Moscow – to be published in Electra April 2006
- Report of AG “Reliability” – to be published in Electra July/Aug 2006
- Intermediate report of WG A2-26 “Mechanical condition assessment of transformer windings” – to be published in Electra 2nd part of 2006

7. SC Website

The SC secretary Cl. Rajotte/CA has provided a very efficient job. The new CIGRE format is fully implemented and a lot of relevant reports for the branch of the transformers have been put on this important interface. It has been started to scan reports issued during previous A2 colloquiums when no modern support like CDROM was available. Presently the scanned reports are stored on the server of the SC secretary as a central system for archives at CIGRE CO does not exist. Such CIGRE central archives would be beneficial.

8. SC Strategic plan & Action plan

The strategic & action plans are available on the WEB site of A2. No modification have been made since last year.

9. SC meetings

In 2005, following an invitation from the Russian National Committee of CIGRE and the state enterprise “Russian Electrotechnical Institute”, the SC meeting was held in Moscow with a colloquium and tutorial. 134 transformer experts, from 30 countries, gathered to discuss field experiences, solutions and trends in the field of transformer reliability and the specific effect of transients on the transformer reliability. A strong delegation of 60 specialists from Russia was attending and simultaneous translation was available throughout the conference. Mr. Anatoly N. Panibratets, First Deputy of General Director of the Russian Electrotechnical Institute, delivered a welcome speech with a brief overview of the remarkable history of electric power technology development in Russia; from early research to 1500 kV transmission systems. Mr. Vladimir V. Dorofeev, Deputy Chairman of the JSC "Federal grid company" told about current problems of Russian electric power and its perspective in a nearest future. Two preferential subjects have been chosen for the 2005 Colloquium. The first one seeks to deepen our knowledge of transformer reliability, taking into account failure statistics, environmental effect of transformer failure, economic aspect, monitoring, and means available to improve reliability. The second subject review recent developments of electrical transients on transformer performance. Authors from all over the world have submitted 35 papers and spontaneous contributions during the meeting have enhanced even further the benefit from the discussion. A complete report has been sent to Electra for publication in Electra, April 2006.

In 2007, the SC meeting will take place in Bruges/Belgium with a joint colloquium SC A2/D1.



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10. SC participations to regional meetings, Colloquium and Symposia

- Tutorial at the Conf. on Transformers in Pieczyska/Poland (May 2005)
- Support to the Conf. on Transformers in Zaporozhye/Ukraine (2005)
- Tutorial at the Conf. on Transformers Trafotech 2006 in Mumbai/India (Jan 2006)
- Tutorial at the Conf. on Transformers Workspot IV in Recife/Brasil (March 2006)
- Tutorial and support to the conf. CMD 2006, Changwon / Korea (April 2006). SC A2 is part of the organising committee.
- Support to the Conf. on Transient Phenomena in Large Electric Power Systems in Zagreb/Croatia (April 2007). SC A2 is member of the technical committee.

11. Relation with other organisation

- Good relations are established with IEC TC 14 and IEEE Transformers as delegates are reporting regularly to SC A2.
- Contact with ISO does exist (see activity WG A2-27)
- The interaction with CIRED is very weak.