10.3. Cigré liaison

The last Cigré session was held in Paris last August.
The transformer meeting was attended by more than 350 delegates.

10.3.1. Session report

Three preferential subject were exposed during the session.

- PS1 : Performance in service of new insulation systems for transformers
  5 papers dealing with high fire point liquids, SF6 insulated transformers and high temperature insulating material were submitted.

  Works on bubbling temperature of natural ester depending on moisture were presented with the conclusion that not only the moisture content but also the rate of the temperature rise is a significant factor.

  The difference streaming behavior of natural ester compared to mineral oil was supported by some test evidence especially when large gaps are concerned. This is of importance for the high voltage application of vegetable oil transformers.

  A new potential benefit of a using higher viscosity oil was presented. With the same oil flow the temperature pattern of zigzag flow windings are much more homogeneous than with mineral oil. The high viscosity forces the oil to a more even distribution between the different paths.

  On SF6 transformers some new techniques similar to the conventional DGA were presented. It is now possible to asses the transformers fault through a gas sample.

  Some new improvement on DGA for silicone fluid was also presented.

- PS2 Reliability and risk assessment of transformer in service
  19 paper will be included in the proceeding on this subject.

  Many different strategy for refurbishment were presented going from equipment only to full replacement of coils. Most of them expecting at least 40 years of life for the refurbish unit.

  Standardization of the transformer types was unanimously presented as large benefits for cost and design review extend, and replacement and spare availability.

  A new condition assessment method of the cellulose based solid insulation using methanol seems to be promising.

  New treatments for corrosive oil were exposed such as the passivator seems to be deceptive. The new treatments try to remove the corrosive compound from the actual oil.

- PS3 Reactors
  Field experience on reactors is split 50/50 between satisfied and unsatisfied users. Some users and manufacturers presented their feed back and new development.

10.3.2. Highlights of the further activities

In 2007 activities were related to preparation of the brochures for the recommendations for the condition monitoring.

The advisory group “UHV AC & DC Transformers” has been involved in the Chinese symposium and supports the A3.22working group in charge of the recommendations for substation equipment over 800 kV.

In 2007, three new working groups have been created in the domain of:

- Transformer procurement process
- Transformer reliability survey
- Transformer thermal modeling

10.3.3. Main technical directions pursued

The two strategic directions of SC A2 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).

10.3.4. Working group and task force reports

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

WG A2-26 - Mechanical condition assessment of windings (P. Picher) created in 2004.
The CIGRE Working Group A2.26 main objective is to develop a guide on the mechanical condition assessment of transformer windings using the Frequency Response Analysis (FRA) method.
The WG has delivered its final report for publication
Part of its work will be proposed for publication in IEC.

WG A2-27 - Recommendations for condition monitoring facilities (P. Jarman)
created as TF in 2003 and as WG in 2005.
The final report has been delivered for publication
Part of its work will be proposed for publication in IEC.

TF A2-30 - Moisture in transformer (V. Sokolov) created in 2004.
This WG has delivered its final report for publication.

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).
The final draft is under revision We expect a closing of this group in 2008.

WG A2-32 - Copper sulphide in power transformer insulation (M. Dahlund) created in 2005.
The test methods proposed by this working group have been adopted by IEC TC 10 for the IEC 62225. The working group will continue to find analysis method for metal passivator and study their stability in service. A new subject is also to work on the experience of the mitigation techniques.
Work expected to be accomplished in 2009

WG A2-33 - Fire Safety (A. Petersen/AU)
The aim is to prepare recommendations to minimize the risk of fires and collateral damages associated with transformer fires. The scope shall cover different parts, mainly: a) Avoidance of tank rupture, b) Precaution to fire victim and c) Precautions to fire origin

WG A2-34 Guide for Transformer Maintenance (C. Rajotte/CA)
The aim is to prepare a guide for transformer maintenance that will help transformer users to define and apply best practices for transformer maintenance (transformer over 69 kV and 25MVA). The Scope shall: a) define a best practices list of periodic actions applied on line or off

line, b) address condition based maintenance and c) human and material aspects of transformer maintenance, with maintenance planning, maintenance tasks tracking, maintenance resources, cost references, level of competences required for different tasks, training, on-site repair, etc.

WG A2-35 Experiences in service with new liquids (R. Martin/UK) created 2007
The aim is to collate and review the in-service experience of using the new fluids in a way which is relevant and beneficial to the electrical industry.
The work is split in: a) Physical and chemical and electrical properties b) Design considerations, c) Review of experiences of these new fluids and with which transformers, d) Review and relevance of existing tests e) Maintenance and retrofilling f) Reliability and longevity and interaction with solids.

WG A2-36 Guide for transformer procurement process (T Brekenbridge/UK) created 2008
The aim is to carry out a full review of the existing A2 document on procurement and to prepare a new guide for assessing the manufacturer capability.

WG A2-37 Transformer reliability survey (S. Tenbohlen/DE) created 2008
The aim is to prepare a brochure with international reliability survey practices. There will be no new survey, but publicly available data's will be used.
The working group will : a) Review all available national survey and study the report practices. b) Discuss the differences and identify the best practices c) compile and present available information d)make recommendation for improvement.

WG A2-38 Transformer Thermal Modeling (J.Lapworth/UK) created 2008
The aim is to describe the state of the art in thermal modeling of transformers specially as far as hot spot is concerned. Example of advanced modeling tools will be included as well as direct measurement practices.

JWG A2/B4 HVDC Transformers (M.Saravolac/ FR) created 2004
The activities of this WG are focused on publication of a brochure for design review of HVDC transformers.

10.3.5. Publications

• State-of-the-art report on 'Fire Avoidance in Transformer Substation', prepared by Prof. D. Allan with the support of J. Declerq and A. Petersen
—published in Electra — April 2007.

• Technology advisory group report — "Power Transformer Technology Review and Assessment"
—published in Electra – February 2008

• Final report/brochure of WG A2-27 — "Recommendations for condition monitoring facilities" — published in Electra – April 2008

• Final report/brochure of WG A2-30 — "Moisture in transformer"
— to be published – first part of 2009

• Final report/brochure of WG A2-36 — "Mechanical condition Assessment of Transformer Winding"
— to be published – 2008

10.3.6. next meetings

17th to 21st August 2009, the SC meeting will take place in Cape Town (ZA) with a joint colloquium SC A2/A3/B3 with the following subject : "Reliability and Availability Management"