MINUTES OF MEETING
BUSHING SUBCOMMITTEE
OF THE
IEEE/PES TRANSFORMER COMMITTEE
LAS VEGAS, NV
OCTOBER 24-28, 2004

8.3 Bushing Subcommittee – Fred Elliott, Chair

8.3.1 Introduction/Attendance

Pritpal Singh, acting Chair, opened the meeting at 3:00 PM and welcomed the members and guests. There were 42 attendees with 19 members and 23 guests present. Two guests requested membership to the Bushing Subcommittee.

Prit stated that due to his retirement, he decided to resign as the Secretary of the Bushing SC and Peter D. Zhao will take the position.

IEEE patent policy was discussed and no patent conflicts were reported at the meeting.

8.3.2 Approval of Minutes of Last Meeting

The minutes were approved as written.

8.3.3 Chairman's Remarks

On behalf of Fred Elliott, Loren Wagenaar made the following remarks after attending the Administrative Subcommittee.

- The Spring 2005 Transformer Committee meeting will be held in Jackson, Mississippi, March 13-17, hosted by Andy Speegle and Kuhlman Electric.
- The Fall 2005 Transformer Committee meeting will be in Memphis, Tennessee, October 23-27, hosted by Randy Williams and ABB Inc.
- AM system will be used for future administration/registration process. Members are encouraged to use the system.
- When contacting IEEE SA on any working documents related issues, a copy at the same time needs to be sent to Bill Chiu Chair – Standard SC.
- Wireless technology is available now, owned by the committee. Members can connect to the Internet during the meetings.
- Transformer committee meeting format will stay at 3.5 days. Thursday meeting will be more efficient. All the reports should be short and to the point.
- Minutes should be marked as **Unapproved**. Their status will change when they are approved at the next meeting. Don Fallon is looking into the process.

In addition, Loren expressed his sincere thanks to Pritpal Singh, for his long time contributions to the committee, and wished him well in his retirement.

8.3.4 Working Group (WG) and Task Force (TF) Reports

8.3.4.1 WG - Revision of C57.19.00 - Keith Ellis, Chair

Keith reported that ;

- Final document has been submitted to REVCOM for further process.
- At the same time, a request has been submitted to extend the PAR.

8.3.4.2 TF - Revision of C57.19.100 – Tommy Spitzer, Chair

The TF Chair opened the meeting at 11:00 AM and welcomed members and guests. There were 50 attendees with 24 members and 26 guests.

Present patent information was discussed.

Minutes of the last meeting were approved as written.

Held discussions on draw lead by Prit Singh on Keith Ellis's comment and made corrections including comments on duration of overloads. Other related standards will be referenced.

Bushing storage was discussed. For new bushings, reference will be made to manufacturer instructions. Other general information will be added and the proposal will be re-worded before the next meeting.

Proposals on on-line monitoring were discussed. It was decided to write a proposal to cover only general information and concerns without going into specific details about the circuits.

Draw lead extensions – the present guide does not mention draw lead extensions, and some wording will be added to address the use of extensions.

The meeting was adjured at 12:15.

8.3.4.3 TF – Bulk Bushings – Bob Hartgrove, Chair

The TF Chair reported that the meeting on Bulk Bushings was held on October 26, 2004 at 3:15 to 4:00 PM. There were 22 attendees with 7 members and 15 guests. 5 guests requested for membership.

An update was given by WARCO and HJ Enterprises upon the status of accumulating dimensional and electrical characteristics of distribution transformer bulk type bushings. Because of the vast number of ratings and dimensions, the task has not been completed by either company as requested by the committee in the Spring meeting.

Definition of bulk bushing was discussed, Prit Singh recommended that we use the definition from the 1991 IEEE Standard. Bob's recommendation was to include the definition in this standard.

There was a major discussion on who specifies bulk type bushings within Distribution Transformers, End User or Transformer Design Engineer, or Transformer OEM Procurement.

Since only two Utilities, or End Users, were present out of the 22 attendees, it was proposed that this committee make all the necessary provisions to ensure that the END Users have good representation. Therefore, Mark Rivers from Doble along with Prit Singh representing ABB proposed to create a survey to be disseminated via Doble Conference Attendees or Doble Clients to survey Bulk Type Bushing standardization and concerns.

Discussions were primarily about Distribution type bushings and not Power. After realizing that there are hundreds of thousands of distribution type bulk bushings being manufactured each year and having many different variations of styles and variations within each kV class, the group unanimously decided to discontinue this effort and propose a task force on GSU type bulk bushings for Power Transformers. Upon this decision the bulk bushing survey was not required by Mark Rivers and Prit Singh. This subject will be discussed at the next Bushing Subcommittee meeting.

8.3.4.4 C57.19.03 – DC busing Standard

TF Chair Fred Elliott sent the following information;

An initial draft of the corrigendum has been circulated to the members of the TF for comments.
A revised draft is being prepared for submission to IEEE for balloting.

8.3.4.5 IEC Bushing Standards Activity - John Graham of Trench Ltd., UK

John Graham submitted his report as follows;

IEC BUSHING STANDARDIZATION WORK

Within IEC, standardization of bushings is covered by Technical Committee TC36: Insulators, Subcommittee SC36A: Insulated Bushings.

Subcommittee officers are:

Chairman: Lars Johnsson, ABB, Sweden.
Secretary: Danilo Perin, CESI, Italy.

The last meeting of SC36A was held at the IEC General Meeting in Beijing, China in October 2002. The next meeting will be NEMA Headquarter, Rosslyn, Virginia, on December 9th 2004.

There are two active working groups:

SC36A WG4: IEC 62199: Bushings for DC Application
Project Leader: Gilles Desilet, TransEnegrgie, Canada.

This document was published in July 2004 and is very similar to the equivalent IEEE standard C57.19.03. DC test voltages are determined in a similar manner, however, definitions and terms follow the IEC styles based on IEC 61378-2: Transformers for HVDC Application. This document has been adopted as a European Standard (EN). It may be possible in future to align the IEC and IEEE standards more closely.

SC36A MT5: IEC 60137: Insulated Bushings for Alternative Voltage above 1 kV.
Project Leader: John Graham, Trench-UK.

Although IEC 60137 Edition 5 was just published in August 2003 due to adverse comments received from the IEC transformer committee TC14 work was immediately restarted. TC14 comments were based on the difference between the tests on bushing and the latest test requirement of IEC 60076-3. In March 2004 a new Committee Draft (CD) was distributed for comment by National Committees.

Comments have been received and will be discussed at the next meeting of SC36A that takes place in Washington later this year.

As reported in San Diego, some compromises have been agreed to increase the range of routine lightning impulse tests for 245kV rating. For transformer bushings in the range 100kV to 170kV, full wave and chopped wave lightning will be included as a type test (based on the testing of three bushings to increase statistical security). A new type test has been added for AC long duration on transformer bushings equal to and above 170kV rating and an EMC test for all bushings above 123kV rating.

The altitude correction factor has been revised following the procedures given in IEC60694 Common Clauses for switchgear (and IEC60071-1) and other equipment standards. The factor k is based on altitude correction above 1000m with different correction for BIL/power frequency and SIL. The change gives higher figure than the present 1%/100m above 1000m e.g. at 3000m the correction factor becomes 1.28 instead of 1.2.

The Maintenance Team met in Geneva, Switzerland in September 2004 and agreed responses to the comments raised on the CD. It is expected that after the Washington meeting the document will go directly to a vote.

Other Work

SC36A MT7: IEC 61463: Seismic qualification of bushings.

This new maintenance team will be set up to review the document published in 1997. This offers a more simplified approach to qualification than IEEE 693, allowing static calculation. No work yet.

CENELEC TC36A WG4 EN____: Capacitance graded outdoor bushings 52 up to 420kV for oil filled transformers

CENELEC is the European parallel committee for IEC and produces standards or harmonization document for use in the European Community. As standards, they have a legal status and override similar standards in member states.
This document will give dimensional standardization for transformer bushings, however at present, work is making no progress and is out of time. CENELEC Management Committee will now decide whether to proceed.

8.3.5 Old Business

Information on CIRGE bushing activity was not reported, however Sam Mehta indicated that there is some activity on bushing reliability in CIGRE Working Group A2.25. A questionnaire has been prepared to collect information on bushing failures.

8.3.6 New Business

No topic was suggested for new business

8.3.7 Technical Papers

No activity was reported for this year, however Prit Singh reported that there were a few papers at the 2003 Doble Conference.

8.3.8 Adjournment

The meeting was adjourned at 3:40 PM.

Minutes Submitted By,

Peter D. Zhao

Secretary
Bushing Subcommittee