MINUTES OF MEETING
BUSHING SUBCOMMITTEE
OF THE
IEEE/PES TRANSFORMER COMMITTEE
Lombard, IL
Oct 28, 2009

8.9 Bushing Subcommittee – Fred Elliott, Chair; Peter Zhao, Secretary.

8.9.1 Introduction/Attendance

Chair opened the meeting at 9:30 AM and welcomed the members and guests. There were 57 attendees with 17 members and 40 guests present. 5 guests were added to the membership after the meeting. 16 members did not attend the meeting.

Copies of the IEEE patent policy summary were circulated with the meeting agenda. The policy was addressed in the meeting and no patent conflicts were reported.

8.9.2 Approval of Minutes of Last Meeting

The minutes of last meeting in Miami, FL were approved as written.

8.9.3 Chairman's Remarks

a) Bushing Subcommittee Meeting Attendance Policy
   Attendance at a minimum of one subcommittee meeting every two years is required to remain a member of the subcommittee. The membership list will be reviewed after every meeting and non-compliant members will be removed from membership. Any exceptions to this policy require approval of the subcommittee chair. Guests who have attended two meetings in the two years prior to the current meeting will be considered for membership in the subcommittee.
b) IEEE Std Interpretation
   Interpretation request to IEEE Stds shall be forwarded to the secretary of IEEE Std Association for response.
c) Committee request for identification on Smart Grid Issues related to Bushing Standards, and then report back to Committee prior to next meeting.

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

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

No meeting was scheduled.

A reaffirmation ballot was conducted for this Standard which is scheduled to expire at end of 2009.

Below is the report from Keith Ellis on the reaffirmation ballot results:

The ballot was successfully with only three negative votes.

a) One negative ballot was editorial in nature and did not rise to the level of a negative ballot. The editorial comments were noted for future consideration.

b) A second negative ballot was also editorial in nature and did not rise to the level of a negative ballot. It did raise one issue missed when the document was published; numbering of key paragraphs were omitted, which can be confusing when referring from one clause to another. The WG Chair will look into correcting this with IEEE.

c) The third negative ballot did raise an issue that did rise to the level of a negative ballot and will be addressed in a future revision cycle.

The first point regarding temperature rise criteria regarding allowable temperature rise of terminal connections. This will be circulated within the working group for discussion.

The second point want routine impulse testing in accordance with IEC 60137, for all bushings above 850 kV BIL being tested.

It was explained that the WG had discussed this issue during the revision process and it was agreed that experience by manufacturers did not justify the added expense imposed by such a requirement.

It is recommended that a Task Force be considered to review all the comments received and determine if there is enough in the comments to warrant a new WG to revise C57.19.00.

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

No meeting. The revision was finished and ready for ballot soon.

8.9.4.3 TF – GSU Bushings – Catherine Hurley

Minutes: Meeting of the Task Force for Generator Step-Up (GSU) Bushing Standardization

October 27, 2009 1:45 pm

1. Attendance: There were 27 people in attendance, as follows: 11 Members; 6 Requesting Membership, and 16 Guests. Introductions were made by everyone.

2. Agenda: An Agenda was presented by the Chair of the Task Force.

3. Minutes: The Minutes of the last meeting in Miami, Florida were presented and approved.

4. PAR: The Chair sent out the PAR, title scope and purpose prior to the meeting for comment and voting before it is formally submitted. It was discussed that there are still remaining members that need to respond but the majority of votes are for the submittal.

5. Draft: Once the PAR is approved y IEEE then the chair will post the draft standard on the website for continuing work and this task force will become a working group.

6. Secretary: A request for a volunteer for secretary was requested due to the previous secretaries commitments. JD Brafa from ABB volunteered after the meeting.

7. Adjournment: The meeting was formally adjourned.

8.9.4.4 C57.19.03 – DC Bushing Standard – Les Recksiedler, Chair

This working group is being replaced by the new IEC/IEEE Maintenance Team JMT-5 for Revision of DC bushing standards IEC 62199 and IEEE C57.19.03. The new standard which will replace these two documents will be numbered IEC/IEEE 65700-19-03. The IEEE PAR for the revision of C57.19.03 will be modified to reflect this change.

The meeting was chaired by Pierre Riffon since Les was not able to attend.

SC36A/JMT5 met on October 29, 2009 from 13;30 to 17:00. Three (3) IEEE WG members, and one IEC MT member from Germany (Reiner Krump, member common to both groups) and five (5) guests attended the meeting. Two (2) guests requested for IEEE WG membership (Mr. Chris Stankowski from Weidman and Ulf Radbrandt from ABB Ludvika). The meeting was chaired by Mr. Pierre Riffon (IEEE WG vice-chair) because the IEC JMT Governor, Mr. John Graham, and the IEEE WG Chair, Mr. Les Recksiedler, were both not able to attend the meeting.

IEEE staff was represented by Mrs. Jodi Haasz.

This was the first meeting of SC36A/JMT5.

The agenda was accepted without changes.

The first item of business was related to a presentation of IEC JMT5 membership and IEEE DC Bushings membership. The members of IEC JMT5 are nominated by their respective National Committees while IEEE members are individuals nominated by the WG Chair.

The IEC working approach has been explained. Contrary to IEEE WGs, the meetings are not a "one man show". Documents need to be reviewed by all participants and decisions are either taken directly during the meeting by all participants or for more complex subjects, assignments are given by the Governor (chair) to members in order to produce proposals that can be discussed in between meetings by correspondence in order to speed up the process.

Mrs. Jodi Haasz from IEEE Staff did present the implantation flowchart showing how both organizations have to process the draft documents up to the final standard (development, voting process, negative comments resolution, etc..). Her presentation is shown in the Annex of the minutes of meeting.

The IEC numbering method has been explained. The proposals shall be numbered as follow:

36A(JMT5/YYYY)XX

Where:

YYYY: is the name of the person making the proposal (ex. RIFFON)

XX: is the incremental number of proposals made by one individual, for example if this is the fifth proposal from Reiner Krump the document number will be 36A(JMT5/KRUMP)05. If it is his first proposal then the numbering will be 36A(JMT5/KRUMP)01.

Then the remaining part of the meeting was dedicated to the review of the comments received on the first draft sent by John Graham. JMT5 and IEEE members observations and individual assignments are shown in the annexed Compilation of Comments.

Because the meeting ran out of time, only a part of the comments have been reviewed and the remaining comments need to be review during the next meeting.

The next meeting will be probably in Europe (to be confirmed by JMT5 Governor) and it has been pointed out that IEEE members could have problems to attend the next meeting.

The meeting adjourned at 17:00 on October 29, 2009.

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

No report.

8.9.4.6. IEEE 693- Interaction of Bushings and Transformers During Seismic Events – Lonnie Elder

No meeting was scheduled.

Some findings and conclusions from the seismic event studies might have a potential impact to IEEE Bushing Standards. At end of the meeting, Keith Ellis presented a video - bushing seismic test performed recently by the study group.

8.9.5. Old Business

8.9.5.1 Task Force on PD Measurement on Bushings & CTs

This TF was formed under Dielectric Tests Subcommittee.
The TF Chair reported that, from next meeting, the TF will start to work on a Guide, and participation from Bushing Subcommittee members is encouraged.

8.9.5.2 Bushing Oil Standardization – Copper Migration Issues

a) No requests for additional presentations have been received since the Spring 2009 Meeting.
b) Is there a need for future action to include Bushing Oil Requirements in the bushing standards? Keith Ellis agreed to take this request to Insulation Fluid Subcommittee for comments and report during next meeting.

8.9.5.3 Technical Papers

No activity was reported for this meeting.

8.9.6 New Business

8.9.6.1 Discussion of temperature rise limits for external connections to bushing terminal – Carlo Arpino

Carlo Arp[ino of EXCELON Commonwealth Edison requested a discussion of the temperature rise of substation bus connections to the top of transformer bushings as a followup to their C57.19.100 interpretation request. The text of his request follows:

> "Can you address and comment in the interpretation of the IEEE Bushings Standards IEEE C57.19.100-1995 ? See below word document .
>
> "IEEE C57.19.100-1995 section 4.1.1 indicates that temperature limitations for bushings are based on average 24-hour insulating oil temperatures (for transformers). It is also noted that section 4.1.3 (e) indicates that the temperature of external connections do not greatly impact bushing hot-spot temperatures unless loading beyond nameplate rating. The loading of our typical transmission facility varies with the daily load cycle and is not continuous over a 24-hour period; therefore the average loading over a 24-hour period will be substantially less than the rated value.
>
> Based on these observations, we are looking to clarify interpretation of the standards regarding the temperature of external conductors connected to bushings. Specifically, is it acceptable that the average conductor temperature, e.g., over a 24-hour period, remain below 70oC (for transformers) or 85°C (for circuit breakers), or should conductors connected to bushings never exceed these temperatures " . "

The major points mentioned in the meeting discussion included the following:

a) Pierre Riffon - IEC 137 provides some coverage on the limits of bushing connector temperature rise, and suggested to look into this std to see if it will answer the question.
b) Catherine Hurley – they had experienced overheating problems on GSU bushings, and solutions: shield around the transformer turret to redirect the leakage flux.
c) Craig Steigemeier – overheating on bus-side bushing connections will flow back to bushings, accelerating insulation and gasket aging.

Further review and clarification of this issue may be needed in a future revision of the Application Guide C57.19.100.

8.9.6.2 Bushing Service Conditions – Devki Sharma and Tommy Spitzer

The question was raised by Devki and Tommy regarding the coordination between the bushing standard C57.19.00-2004 and the application guide C57.19.100-1995.

Standard C57.19.00 Clause 4.1 includes usual service conditions as follows:

- Ambient air temperature not to exceed 40 deg C and average over 24 hours not to exceed 30 deg C.
- Temperature of transformer insulating oil in which the inboard end of the bushing is immersed not to exceed 95 deg C average over 24 hours.
- The external terminal and bus connections not to exceed 30 deg K rise over ambient.

Application Guide C57.19.100 clause 4.1.1.1 contains advice stating that rated temperatures in the bushing may be exceeded during some high temperature loading conditions resulting in reduced bushing life expectancy. Clause 5.2 gives advice for derating of bushings under this high temperature condition.

The concerns expressed during the discussion are that these two items are confusing and may even appear to be in conflict with each other. The wording and advice may need to be better coordinated in future revisions of the documents. This item will be carried forward to the next meeting for further discussions.

8.9.6.3 Breaker Bushings – Activity in Breaker Committee

It was reported that Switchgear Committee will ballot a Standard for Circuit Breaker Bushings (PC37.017, Standard for Bushings for High Voltage (over 1000 Volts ac) Circuit Breakers and Gas Insulated Switchgear). Interested individuals should join the balloting group.

8.9.7 Adjournment

The meeting adjourned at 10:45 PM.

Minutes submitted respectively by,

Peter Zhao

Secretary
Bushing Subcommittee