

**MINUTES OF MEETING  
BUSHING SUBCOMMITTEE  
OF THE  
IEEE/PES TRANSFORMER COMMITTEE  
Boston, MA  
November 2, 2011**

**10.7 Bushing Subcommittee – Peter Zhao, Chair; Eric Weatherbee, Secretary.**

**10.7.1 Introduction/Attendance**

Chair opened the meeting at 9:30 AM and welcomed the members and guests. A quorum was formed by confirmation of member attendance. There were 87 attendees with 20 members and 67 guests present.

Patent policy was addressed in the meeting and no patent conflict was reported.

**10.7.2 Approval of Minutes of Last Meeting**

The minutes of last meeting in San Diego, CA were approved as written.

**10.7.3 Chairman's Remarks**

- a) Next meeting will be held in Nashville, TN on March 11<sup>th</sup> through March 15<sup>th</sup> hosted by Baron USA, INC.
- b) Discussed changes to the meeting format
- c) Reviewed the current status of all bushing committees and future dates. Including the newly approved PAR for the GSU Bushing Working Group.

**10.7.4 Working Group (WG) and Task Force (TF) Reports**

**10.7.4.1 WG - Revision of C57.19.00 - Keith Ellis, Chair**

Reaffirmed C57.19.00-2004 – New expiration date is Dec. 31, 2015

**10.7.4.2 WG - Revision of C57.19.01 – Arturo Del Rio, Chair**

The working group met on Tuesday November 1, 2011, at 9:30 am with a total of 32 participants. Of those, 12 members and 20 guests with 5 guests requesting membership.

- The meeting was opened with introductions and the presentation and review of the minutes from the previous meeting.
- The first topic in the agenda was the review of the scope of the standard to avoid conflict with the work being done on the standardization of GSU bushings for use in bus-enclosures. The proposed new scope includes the 150 kV BIL level, limits the rated continuous current to 5,000 amps or less, adds the "for use in free-air" statement and eliminates the reference to an obsolete standard. Members of the working group are encouraged to send comments or propose changes with a brief justification for further discussion.

- Five topics related to comments submitted during the balloting process of the standard in 2000 and the subsequent reaffirmation in 2005 were discussed:

1. Add 25 kV, 115 kV and 161 kV bushings to preferred ratings.
2. We should take all listed styles though 230 kV to 5,000 amps as we are seeing larger and larger power transformers being purchased.
3. It is time to dump the breaker plates on HV bushings. By replacing the breaker plate with a smaller connection plate with an integral 2-hole or 4-hole spade.
4. The TBI cantilever requirements should be put back because the bushing manufactures did not change the designs to reduce the bushing mechanical strength in order to “meet” the lowered requirement specified in the 2000 version.
5. Review BIL, and Hipot test requirements for bushings for all voltage classes, to be more in line with other existing standards (IEC, CSA).

Each one of these items needs to be put in tabular form for comparison and better understanding and illustration in future discussions.

- Meeting was adjourned at 10:30 am.
- Any members of the Bushings Subcommittee are welcome to join this new WG and participate in the revision of the Standard.

Minutes by: Arturo Del Rio, WG Chair.

e-mail: arturod@ieee.org

Boston, November 1, 2011.

#### **10.7.4.3 WG - Revision of C57.19.100 – Tommy Spitzer, Chair**

The guide was submitted for ballot, there were negative votes and 218 comments. These could not be resolved before the October 25<sup>th</sup> deadline. A PAR extension has been requested.

#### **10.7.4.4 WG PC57.19.04 – GSU Bushings – Catherine Hurley, Chair**

Minutes: GSU Bushing Standardization WG PC57.19.04

November 1, 2011 @ 1:45pm - Caspian Room at the Renaissance Hotel / Boston, MA

1. Attendance:
  - a. 30 attendees:
    - i. 11 of 18 Members were present (quorum was reached)
    - ii. 19 Guests
      1. 3 New Guests
      2. 16 Repeat Guests
  - b. 9 Repeat Guests requested membership
    - i. 8 were granted membership due to active history of participation
      1. Keith Ellis
      2. Wayne Johnson
      3. Mario Locarno
      4. Benjamin Lopez
      5. Doug McCullough
      6. Shankar Nambi
      7. Anthony Natale
      8. Van Nhi Nguyen
  - c. Membership total now at 25
2. Agenda:

- Meeting minutes from Fall 2010 meeting were presented and no objections were noted
  - Discussed loss of Chair (Catherine Hurley) and Vice-Chair (Les Recksiedler)
  - Nominations for positions of Chair and Vice-Chair were taken. Nominees include (in alphabetical order):
    1. Carlo Arpino, ComEd
    2. J D Brafa, ABB Inc.
    3. Scott Digby, Progress Energy
    4. Bob Ganser, Consultant
    5. Mike Lamb, Dominion
    6. Mike Lau, Weidmann
    7. Dave Ostrander, Ameren
    8. Kirk Robbins, Exxon Nuclear
    9. Michelle Ward, Doble Engineering
    10. Jim Zhang, APS
    11. Shibao Zhang, Hubbell / PCORE
  - Presentation on *General Considerations of Bushings Applied in Metal Enclosed Bus* was offered by JD Brafa
  - Group discussion regarding major obstacles we will encounter proceeding forward, increased user participation, low temperature considerations, and minimum requirements to obtain membership.
3. Adjournment: The meeting was adjourned at 2:50pm

#### **10.7.4.5 C57.19.03 – DC Bushing Standard – Les Recksiedler (IEEE) and John Graham (IEC), Chair**

##### IEC62199 “Bushings for DC Application”

- SC36A MT5 is working with The IEEE Bushing subcommittee with a joint working group to produce a dual logo document. Three meetings have been held, in Lombard (Fall 2009), Houston (Spring 2010) and Toronto (Fall 2010). Work has proceeded by email to avoid a meeting in Europe. Committee draft (CD) was circulated in May 2001 for comment to IEC and IEEE members. Comments have been received from
- both groups, IEC comments were discussed in Melbourne. Most comments from IEEE concerned the presentation of the document in IEC format with mainly IEC references. IEC Central Office and IEEE Program Manager have been asked for guidance on the agreed method for presentation of Dual-Logo standards. The document will go to IEEE ballot.
- No meeting was held in Boston pending completion of the comments.
- It is hoped to discuss comments at the Nashville meeting.

#### **10.7.4.6 IEC Bushing Standards Activity - John Graham**

##### IEC Meetings

The IEC bushing committee SC36A met during the IEC General Session in Melbourne, Australia on October 21st 2011. Work on the following documents was discussed.

##### IEC60137 “Insulated Bushings for Alternating Voltages above 1000V”

Edition 6 was published in July 2008; at the Sao Paulo meeting in 2008 the maintenance date for IEC60137 is set at 2011 and work started in April 2011 on a new revision. The main purpose is to include test values for UHV bushings (above 800kV rating) in line with the latest edition of

IEC60071-1: Insulation Co-ordination. During the revision the working group will address inconsistencies in the test method for temperature rise of external connections – this inconsistency also exists in IEEE C57.19.00. Also changes to the calculation of creepage distance in line with IEC60815 will be included. In May 2011 a draft for comment (DC) was circulated and comments received were discussed in Melbourne. The main comments concerned the need for alignment with the proposed revision to the transformer testing specification IEC60076-3, this may include increase the range of application of Switching Impulse tests.

#### Other Work –

The stability dates of other standards have been extended.

IEC61463 Seismic qualification of bushings – a call for experts will be made to form a new maintenance committee. IEC61464 Dissolved gas analysis of oil impregnated paper bushings – no work planned until IEC TC10 completes revision of the main DGA standard IEC60599. The bushing subcommittee will be responsible for interpretation of analysis with TC10 responsible for methods.

#### CENELEC

The European standards organization has recently published revisions of bushing standards for low voltage bushings.

EN50180 – Bushings above 1kV up to 52kV and from 250A to 3.15kA for liquid filled transformers.

EN50386 – Bushings up to 1kV and from 250A to 5kA for liquid filled transformers.

#### Chairman

SC36A Chairman Lars Johansson (Sweden) will retire in 2012 after 9 years in the role. The Italian National Committee proposes to nominate John Graham (UK) as successor.

### **10.7.4.7 IEEE 693 - Interaction of Bushings and Transformers during Seismic Events – Lonnie Elder**

Eric Weatherbee gave a brief update on the progress and transition the working group is currently undergoing in regards to the bushing/transformer interaction. Discussions ensued in regards to what is considered a failure of a qualified bushing.

### **10.7.4.8 Task Force on PD Measurement on Bushings & CTs - Thang Hochanh, Chair**

The Chair asked for member comments on the materials that were presented during the meeting.

### **10.7.5 Unfinished Business – none**

### **10.7.6 New Business - none**

### **10.7.7 Presentation – General Considerations of Bushings Applied in Metal Enclosed Bus by J D Brafa (available online)**

Before the presentation started Peter Zhao discussed the history and needs leading up to the decision to start moving forward with the creation of GSU working group. He stressed the importance of end user participation as well as both bushing and transformer manufacturers.

Presentation summary:

- Major differences between bushings applied in a metal enclosed bus and standard bushings as defined by IEEE C57.19.01

- What can happen to a bushing applied to but not designed for this type of environment.
- Obstacles the GSU committee will have to overcome in order to finalize the GSU bushing standard since it is a dimensional standard.

Lengthy discussion took place after the presentation was completed; including dimensional considerations for new and replacement bushings. A member of C57.116 (guide for transformers directly connected to generators) who mentioned their group is also looking at these same issues. The Chair suggested the new GSU working group chair will get in contact with the chair of C57.116 to share information and resources.

#### **10.7.8 Adjournment**

The meeting adjourned at 10:45 PM.

Minutes submitted respectively by,

Eric Weatherbee

Secretary  
Bushing Subcommittee