## ANNEX A Bushings Subcommittee

**October 26, 2016**

**Vancouver, BC, Canada**

## Chair: Peter Zhao was unable to attend, therefore Eric Weatherbee filled in as Chair for this meeting Secretary: Eric Weatherbee, JD Brafa filled in as Secretary for this meeting

1. **Opening of the Meeting**

**A.1.1 Introductions**

The Chair opened the meeting with group introduction.

**A.1.2 Attendance**

Membership count was taken with the following results: 26 of 43 members were present with 106 guests and 2 corresponding members for a total of **134 attendees**. There were 16 new membership requests. There was a quorum.

**A.1.3 Chairman’s Remarks**

The Chair asked for a motion to approve the meeting agenda that was distributed prior to the meeting, a motion was made by Mr. Dave Geibel and seconded by Mr. Raj Ahuja with no objections.

The Chair asked for a motion to approve the S16 Georgia minutes that were distributed prior to the meeting, a motion was made by Mr. Craig Stiegemeier and seconded by Mr. Dave Geibel with no objections.

Three new members were introduced to the SC and added to the roster. The new members were Mr. Alwyn VanderWalt, Mr. Yves Vermette and Mr. Matthew Weisnsee. All three new members were in attendance and therefore the member count was increased to 29 of 46 members in attendance.

The Chair presented the Standards Status Report for bushings, see Appendix A. It was noted that C57.19.00-2004 will expire at the end of 2020 and that Mr. Peter Zhao, the Chair of the SC, would like to have the standard updated prior to the expiration.

1. **Working Group and Taskforce reports**

**A.2.1 C57.19.00-2004 – Keith Ellis, Chair (not present)**

Mr. Keith Ellis was not in attendance; as such no new information was relayed to the SC.

**A.2.2 WG PC57.19.01-2000 – Dr. Shibao Zhang, Chair; David Wallach, Secretary**

Dr. Zhang informed the SC that the WG voted and would like to proceed to ballot with the document. Mr. Dave Geibel made a motion for the SC to vote on proceeding to ballot which was seconded by Mr. Sebastien Riopel. The vote count was taken with a unanimous agreement to proceed to ballot and therefore there were no objections. See complete WG minutes in Appendix B of this report.

**A.2.3 C57.19.100-2012 – Tommy Spitzer, Chair (not present)**

Mr. Tommy Spitzer was not in attendance; as such no new information was relayed to the SC.

**A.2.4 WG PC57.19.04 – Scott Digby, Chair; JD Brafa, Vice Chair; Secretary, Jim Campbell**

See complete WG minutes in Appendix C of this report.

**A.2.5 IEC/IEEE 65700.19.03 – Les Rechsiedler (IEEE) and John Graham (IEC), Co-Chairs**

The first dual logo standard was approved June of 2014, as such no meeting was held.

**A.2.6 WG PC57.19.02 Distribution Transformer Bushings – Steven Shull, Chair; Ed Smith, Vice Chair**

See complete minutes in Appendix D of this report.

**A.2.7 TF Composite Bushings – John Graham, Chair; Secretary, Robert Middleton**

The Chair informed the SC that Mr. John Graham, TF Chair, had submitted the TF report to Mr. Peter Zhao at the conclusion of the last conference with their suggestions. As this TF as completed its tasks no new information was relayed to the SC at this time.

1. **External Liaison Reports**

**A.3.1 IEC Bushing Standards Activity – John Graham, IEEE Liaison (not present)**

Mr. John Graham was not in attendance but did submit a report for the SC to review during the meeting. Mr. Dave Geibel noted a slight correction to a statement in the report. Mr. Geibel is a member of A2:43 Bushing Reliability and it was stated that the brochure was recently published. However, Mr. Geibel assured the SC it actually has not been released at this time. See complete report in Appendix E of this report.

**A.3.2 IEEE 693 – Eric Weatherbee, IEEE Liaison**

Mr. Eric Weatherbee informed the SC that 693 is in the ballot process and the vote took place at the beginning of August. He had contact Mr. Eric Fujisaki, the Chair for IEEE 693, for any information that could be shared to the SC at this time. Mr. Fujisaki provided the following information:

*“We went through our first ballot and fell 1 vote short of approval. We received 400+ comments and have made a quick review. I feel that most can be accommodated. I plan to reconvene the comment resolution subcommittee to get some concurrence on disposition, then recirculate, date TBD. We requested an extension to our PAR expiration date which is 12/31/2016 in order to address the comments and recirculate.”*

**A.3.3 WG PC57.160 Guide for PD Meas. in Bushings and Inst. Trans. – Thang Hochanh, Chair**

Mr. Thang Hochanh informed the SC that during the last WG meeting it was noted that the document discusses DC bushing however, they are not listed in the PAR. The WG did vote and approve proceeding to revise the PAR and he would also like a vote from the Bushing SC in the matter. Motion was made by Mr. Sanjib Som and seconded by Dr. Shibao Zhang to vote on seeking a revision to the PAR to include DC bushings. A vote was taken and 25 of 46 members voted to precede with the revision with no objection, therefore the motion carried. See complete WG minutes in Appendix F of this report.

1. **Unfinished Business**

**A.4.1 No unfinished business to discuss at this time**

1. **New Business** 
   1. Mr. Jim Zhang had submitted an inquiry to the SC in regards to 500kV bushings.

Although Mr. Zhang was unable to attend this meeting or thus provide additional feedback, his inquiry was presented for discussion as it was submitted:

*“Current IEEE standard has only one voltage level for 500 kV systems, which is 500 kV nominal, 550 kV max. As we also know, some of the utilities operate 500 kV system at 525 kV Nominal, therefore 550 kV max. voltage is too low for this nominal voltage. Suggested is if additional voltage level of 525 kV (nom.) will be introduced into the standard.”*

Most of the comments from the SC stated that they could not offer any pertinent feedback at this time. However, they felt if Mr. Zhang can provide some additional information at the next meeting they may be able to share a more substantial opinion on the subject.

Mr. Fred Elliott, former Chair of this SC, did offer a plausible explanation. Mr. Elliott stated there is some confusion on the 500kV nominal with a 550kV maximum. For all the bushing ratings there is only a +5% allowance for the maximum. However, it was decided that 500kV nominal and 525kV nominal are close enough together it could cover both by extending the maximum over 500kV up to +10% i.e. 550kV maximum. As such, 525kV nominal with its +5% maximum is included within this range.

* 1. Mr. Gustavo Leal stated there is a need to have On-Line Bushing Monitoring covered in one of the standards or guides.

Mr. Leal Stated that his company has been doing pilot testing with On-Line Bushing Monitoring and ran into an issue when a bushing manufacturer recommending not using online bushing monitoring on their product due to a bushing design issue. Because of this recommendation, executive management at the utility put a hold on the bushing monitoring project. The lack of any IEEE TX standard in this area prevented him from being able to provide suitable information to keep the bushing monitoring project active.

* 1. Mr. Ajith Varghese asked that draw lead cable sizes be added to the bushing standards.

It was noted that many, if not all bushing manufacturers can provide their recommendations for the cable sizes for their specific products.

Mr. Fred Elliott stated that it was attempted to have these values provided in the standard as Mr. Varghese suggested. However, they could not reach a consensus amongst the bushing manufacturers, as such it was decided that each manufacturer should provide recommendations upon request.

* 1. Mr. Raj Ahuja proposed that Dry Switching Impulse test be required for all bushing design tests and the values stated on the sales drawings.
  2. Several commenters raised concerns and express the need for easier determination of bushing overload.

The initial commenters stated they would like to have bushings derated so that they have a “built” in overload capability and therefore do not have to calculate it for each application. Another commenter said there are parameters for in-service transformers stated in the transformer standards that could be used to determine the overload capability.

Mr. Dave Geibel stated that bushing manufacturers provide the thermal constants for their bushing so that their capabilities can be calculated for any applications. Mr. Geibel also stated that the bushing standards do not require any overload capabilities beyond the rated current as specified on the bushing name plate. Some OIP bushing may have some extra capabilities but is dangerous to assume resin type bushings have any at all. At the rated current these types of bushings may be at or very close to the Tg rating of the material and it is dangerous to cross that threshold. Mr. Geibel stated he would like to see something added in the bushing or transformer standards similar to IECs 120% rule-of-thumb.

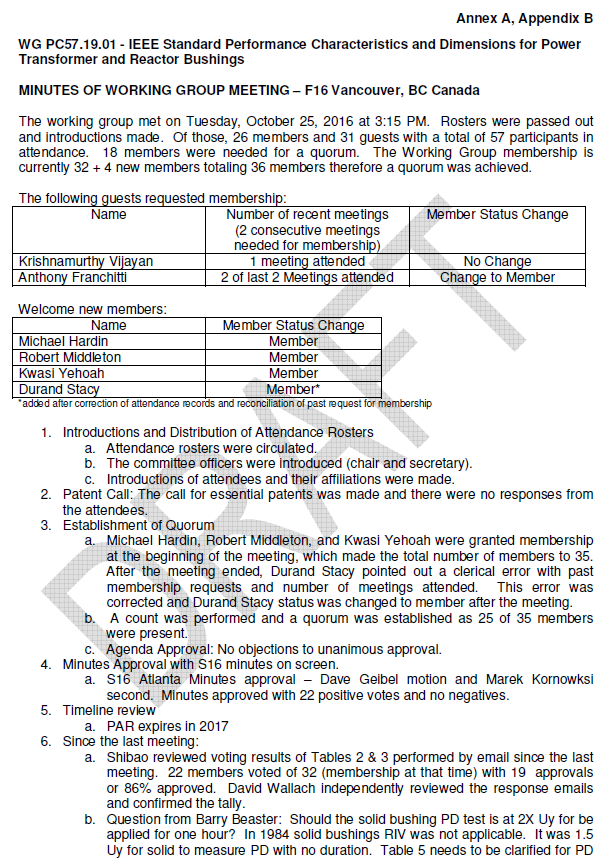
Dr. Shibao Zhang commented that the first step should be to calculate the overload capability for the specific application as the rule-of-thumb is not always sufficient and it should only be used as the last option if you cannot obtain the needed values for calculation. Mr. Geibel also agreed that calculation is the best/first method that should be used.

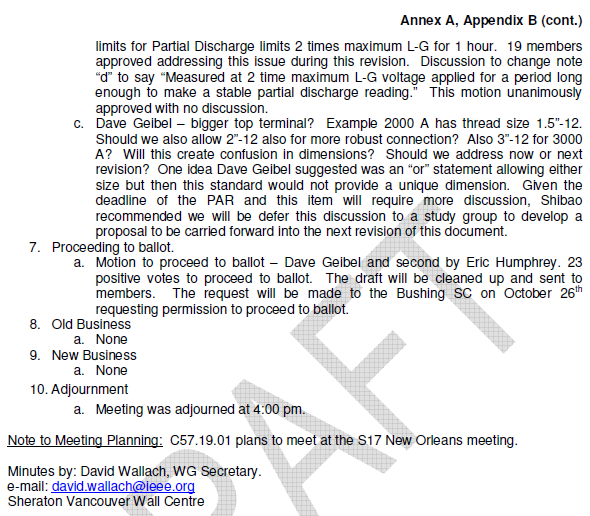
The Chair noted that Mr. Tommy Spitzer, Chair for C57.19.100, has stated he will be working on getting a consensus for overload recommendations and add it back into the Bushing Application Guide and that he will start work on the next revision soon.

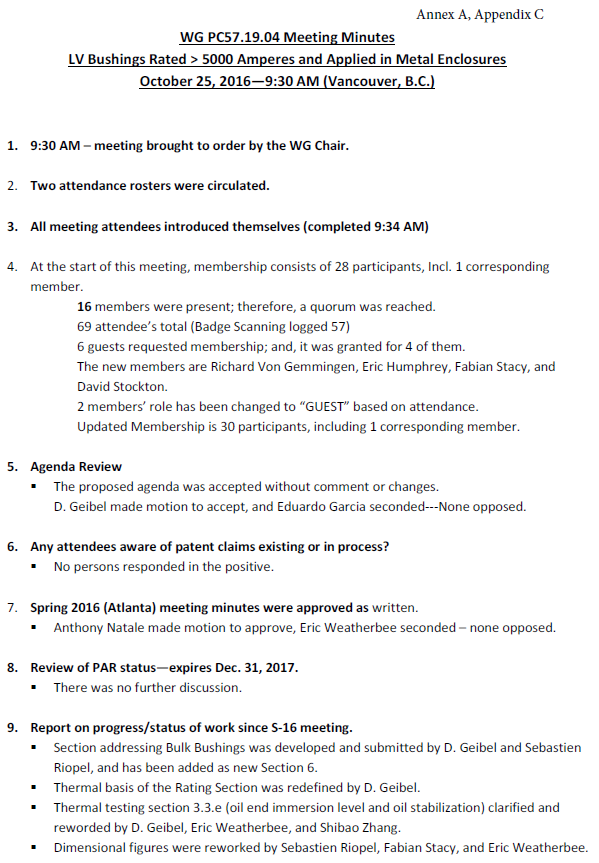
\*Note: following the meeting Mr. Fred Elliott commented to the Chair and Secretary that their SOP for overload was to use 130% bushing rating over that of the transformer. But they had some cases that this still wasn’t enough and found they needed 150%.

1. **Adjournment 10:25 am**



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