Distribution Transformer Subcommittee
Task force / Working Group Report

Document #: PC57.19.02

Document Title: Standard for Design and Performance Requirements for Bushings Applied to Liquid Immersed Distribution Transformers

Chair: Steve Shull **Vice-Chair** Ed Smith

Secretary Fred Friend

Current Draft Being Worked On: D1 **Dated:** March 2017

Meeting Date: April 4, 2017 **Time:** 11:00 am – 12:15 pm

Attendance:		
	Members	**27**
	Guests	**22**
	Total*	**49**

*** For details of attendance, please refer to AMS system of the Transformers Committee**

Meeting Minutes / Significant Issues / Comments:

The meeting was called to order by the Chair at 11:00am, the roster was circulated, followed with an introduction of members and guests. A check for quorum was made and achieved. The Chair made a call for any Essential Patent Claims and none were brought forward. A motion was made by Ron Stahara and seconded by Dan Sauer for approval of the agenda. The motion was unanimously approved. A motion was made by Martin Rave and seconded by Marek Kornowski for approval of the Fall 2016 meeting minutes. The motion was unanimously approved. A motion was made Dan Sauer and seconded by Jerry Murphy for the approval of the Spring 2016 meeting minutes. The motion was unanimously approved.

Under Old Business, discussions centered on these items in the sample document provide by the Chair.

- Table 1 – Electrical Insulation Characteristics
- Table 2 – Cantilever Design Test Requirements
- Figure 1 – Standard Stud Sizes
- Figure 2 – Standard Mounting Holes
- Figure 3 – Termination Configurations

The working group felt that the document provided by the Chair was a good start but it needed more work. It was suggested that the bushing range shown in the Table 1 be widened. The Chair commented that this was the goal but he would like to direct the group to focus more on the 600 volt and below or rather 1.2kV and below, since this voltage range covers the majority of service voltages supplied in North America. There was a discussion on the 45kV BIL bushings. It was pointed out that sometimes these were specified to gain additional creep when the transformer was in a contaminated area. However, it was also pointed out that these were used on 2.4kV distribution applications as well. It was suggested that this be considered in Table 1 and a method to address this concern be developed.

There was a discussion on how the nominal current rating was determined in Table 2. Peter Zhao, Bushing Subcommittee Chair emphasized the need to coordinate our work within the existing bushing standards and not duplicate any work that is already in C57.19.00 and C57.19.01. The Chair agreed. Peter further commented that if the range of the values or test methods are not applicable or exceed the limits in these documents, it would be permissible to

place these test methods and tables in this standard but care must be taken not to repeat or misdirect a test already in the previously mentioned standards.

After a lot of discussion, the following Task Forces were formed and were asked to provide their recommendations at the next meeting:

Table 2 – Cantilever Design Test Requirements.
Dan Sauer (Chair), Josh Verdell, Mike Thibault, and Marek Kornowski
This task force will review the design of Table 1 in light of questions raised by the group concerning the differences in the columns labeled “unsupported” and “with supports”. The “with support” column allows the bushing to be loaded to a higher level which caused concern for the group as the shear force at the tank can be a critical point. It was asked that a cantilever test procedure be developed as a part of this task force’s work. This would include the review of C57.19.00 or C57.19.01 to determine if an applicable test for this table was already developed.

Figure 1 – Standard Stud Current Values
Dave Geibel (Chair), Carlos Gaytan, Ali Ghafourian, Dan Saur, and Weijun Li.
This task force will work on determining the correct minimum current values for these specific stud sizes. This will include background on how these values were determined.

Figure 1 – Standard Stud Sizes and Figure 3 – Termination Configurations
Al Traut (Chair), Ed Smith, Josh Verdell, and Marek Kornowski
The working group had concerns about Figure 1 in that it was showing a bushing which was confusing the real intent which was to display the “minimum usable thread length” both inside and outside of the tank. In this conversation the configuration of the terminals on the outside of the tank was discussed. It was pointed out that a fairly through document, NEMA CC-1 “Electric Power Connectors for Substations” was available that described these connections. There was also a concern about the product on which these would be used since these could be used on pole and padmounts transformers. It was also pointed out that the drawings needs to be oriented correctly and have consistent drafting views. So in conclusion, it was fairly clear from the discussion that this standard would only cover bushings that had these terminals were included as an integral part of the bushing. The charge of this group would be to provide guidance on the future of these figures and associated tables.

Figure 2 – Standard Mounting Holes
Martin Rave (Chair), Josh Verdell, Darren Brown, and Israel Barrientos
This task force’s charge would be to complete the tank hole table. They would review the accuracy of the information and format of the table as needed.

There was no new business presented. The meeting was adjourned at 12:03 pm.

The next meeting will be in October 31, 2017 in Louisville, KY

Submitted by: Fred Friend

Date: 04/05/2017