

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: Ed Smith Vice-Chair Steve Shull

Secretary Fred Friend

Current Draft Being Worked On: D1.2 Dated: October 2018

Meeting Date: October 16, 2018 Time: 11:00 am – 12:15 pm

Attendance:	Members	<u>31</u>
	Guests	<u>28</u>
	Total*	<u>59</u>

* 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 introductions of members and guests. The Chair made a call for any Essential Patent Claims and none were brought forward. A check for quorum was made and achieved. A motion was made by Dave Geibel and seconded by Jerry Murphy for approval of the agenda. The motion was unanimously approved. A motion was made by Dave Geibel and seconded by Jerry Murphy for approval of the spring 2018 meeting minutes. The motion was unanimously approved. Steve Shull informed the group that he and Ed Smith were exchanging roles. Going forward Ed will be the Chair and Steve will be the Vice-Chair.

The various Task Forces presented reports:

Taskforce report – Cantilever Design Test Requirements

This discussion was led by Steve Shull as he switched to the D1.2 document. He showed two sections that he had created for the bushing cantilever testing from the taskforce's report. One designed for leak detection and the other for ultimate strength testing. The discussion of the leak detection section led to these conclusions:

- It should be made clear somewhere in this section that leak detection would not be a part of the bushing manufacturer design testing but be solely the responsible of the entity making the application on the oil filled equipment.
- There will be a working torque value maximum based on the ultimate torque value developed from the ultimate strength test. A task force was formed to research C57.19.100 and IEC 60137 to develop what this level should be. The taskforce will be chaired by Steve Shull and the members will be Dave Geibel, Ed Smith, and Carlos Gaytan.
- The test conditions for this item were modified to 7 psi to coordinate with C57.12.39. There was some discussion concerning the temperature of the test but it was finally decided that the temperature would stay as shown but guidance would be added to how this test could be interpreted at higher temperatures. It was suggested that the test be at a fixed temperature then apply some type of margin could be applied. The taskforce will add this to their list for study.

The discussion of the bushing ultimate strength testing led to these conclusions:

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- The application of the test load would be located at the minimum stud length point of the type of bushing that was being tested.
- The test on a stud mounted bushing will need more work as the direction of the force was not specified. It could be defined by either being in line with the stud mounting bolts or otherwise particularly when applied to the three bolt mounting design. A comment was made that if the three bolt pattern was mounted with the one bolt sustaining the full load, the rating of the bushing could be reduced as much as 20%. Another suggestion was just to state the bushing should be mounted in the worst case orientation which creates the lowest torque value. This item was added to the previous task force's research.
- It was suggested we change the word "distortion" shown in section 3.3.2 to "permanent deformation" to better match the terms used in C57.12.39. There was no opposition to this change.

Taskforce report – Standard Mounting Holes

Rhett Chrysler reported for Martin Rave. This task force was charged to develop the minimum stud length shown in Figure 4, Standard Mounting Hole and Stud Patterns. They surveyed three manufacturers and develop the following levels.

Mounting Hole Designation	Minimum Mounting Stud Length Recommendation	Minimum Mounting Stud Length Manuf. 1	Minimum Mounting Stud Length Manuf. 2	Minimum Mounting Stud Length Manuf. 3
SA	38 (1.50)	38 (1.50)	41 (1.63)	38 (1.50)
S	38 (1.50)	38 (1.50)	41 (1.63)	38 (1.50)
S1	38 (1.50)	51 (2.00)	41 (1.63)	38 (1.50)
S2	51 (2.00)	51 (2.00)	54 (2.13)	57 (2.25)

These minimum mounting stud lengths would be placed in the table shown in Figure 4.

Taskforce report – Stud Sizes

Al Traut reported that they developed a new drawing to show the stud mounted bushing with an internal spade connection. During the discussion it was found that a dimension was left off the drawing in that the spade width was not specified. Al and Steve Shull would work on adding the minimum width values to the drawing. Also a new stud size was discovered and added to standard stud size table. This task force was to verify the thread designation and useable thread lengths. These items will reported at the next meeting. As well the statement designating the measurements minimums would be removed and placed into the table headings so that it will be more than informative.

It was announced that the next meeting would be on March 26, 2019 in Anaheim, CA. The meeting was adjourned at 12:15 pm.

Submitted by: Fred Friend

Date: 10/17/2018