

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 Martin Rave

Current Draft Being Worked On: D1 Dated: March 2017

Meeting Date: October 31, 2017 Time: 11:00 am – 12:15 pm

Attendance:	Members	<u>26</u>
	Guests	<u>29</u>
	Total*	<u>55</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 11:00 am, 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 Dan Sauer and seconded by Ron Stahara for approval of the agenda. The motion was unanimously approved. A motion was made by Dan Sauer and seconded by Ron Stahara for approval of the Spring 2017 meeting minutes. The motion was unanimously approved.

The various Task Forces presented the results of their reviews:

Table 1 – Cantilever Design Test Requirements

Dan Sauer (Chair), Josh Verdell, Mike Thibault, and Marek Kornowski
Dan Sauer presented the Task Force proposal for a distribution transformer bushing cantilever test procedure. The cantilever strength and design test requirements in C57.19.00 and C57.19.01 were reviewed and modified by the Task Force for the distribution transformer bushing proposal. The discussion following the presentation focused on the proposed torque values and whether the requirement should be for the bushing to be mounted to a standard fixture or representative transformer tank wall. If the bushing is mounted to a representative transformer tank wall, a standard thickness for the tank wall needs to be determined.

The Chair requested the Task Force to reassess the proposed cantilever test procedure based on the Working Group discussion and provide recommendations regarding torque values and bushing mounting requirements (standard test fixture or representative transformer tank wall). Carlos Gaytan has been added to the existing Task Force.

Figure 1 – Standard Stud Current Values

Dave Geibel (Chair), Carlos Gaytan, Ali Ghafourian, Dan Saur, and Weijun Li
Dave Geibel presented the Task Force research of information regarding standard stud/bolt sizes, associated nominal current ratings, and the resulting temperature rise of the stud/bolt. The presentation highlighted the importance of the stud/bolt temperature in contact with the oil, the stud/bolt temperature in contact with bushing “plastic” materials, the stud/bolt temperature in proximity

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of gaskets, and the stud/bolt temperature in proximity to cable insulation of cables connected to the bushing on the exterior of the tank.

The Chair requested the Task Force to formulate a proposal to the Working Group based on the research and information already conducted and discussion during the meeting.

Figure 1 – Standard Stud Sizes and Figure 3 – Termination Configurations

Al Traut (Chair), Ed Smith, Josh Verdell, and Marek Kornowski

Al Traut presented the Task Force research of information regarding standard stud sizes. The external stud length on bushings with 1-1/4" studs for single phase and three phase transformers needs to be resolved. The presentation included recommendations regarding dimensions for bushing eyebolt and spade terminal dimensions shown in Figure 3. The Task Force recommended creating two figures, Figure 3A and 3B, with Figure 3A describing the requirements for bushings with eyebolt terminals and Figure 3B describing the requirements for bushings with spade terminals.

The Chair requested the Task Force to provide recommendations for details regarding internal stud dimensions for Figure 1 and provide recommendations for details regarding spade terminal dimensions for Figure 3B.

Figure 2 – Standard Mounting Holes

Martin Rave (Chair), Josh Verdell, Darren Brown, and Israel Barrientos

Josh Verdell presented the Task Force research regarding mounting hole information details from multiple manufacturers. Josh Verdell suggested increasing the tolerances on the various mounting hole dimensions to resolve the minor dimensional differences.

The Chair requested the Task Force to provide recommendations for mounting hole dimensions for three phase transformers. Rhett Chrysler and Ali Ghafourian have been added to the Task Force.

Ali Ghafourian recommended reviewing the impact of tank thickness on bushing mounting requirements.

There was no new business presented. The meeting was adjourned at 12:15 pm.

Submitted by: Martin Rave

Date: 10/31/2017