

## **Annex D Dry Type Transformers Subcommittee**

**October 30, 2019**

**Columbus, OH USA**

**Chair: Casey Ballard**

**Vice-Chair: Vacant**

**Secretary: David Stankes**

### **D.1 Introductions and Approval of Agenda and Minutes**

The Subcommittee met on October 30, 2019 at 1:30PM in the Union AB room of the Hyatt Regency Columbus Hotel.

The meeting was convened with 38 people in attendance. 18 of the 26 members of the Dry Type Subcommittee were present, so quorum was reached. Five guests requested membership including: Aniruddha Narawane, Juan Pablo Medina, Colby Lovins, Justin Shrewsbury and Moonhee Lee. Based on attendance records all five will be granted membership. The attendance roster will be recorded in the AMS. Participants at the meeting introduced themselves and roster was circulated.

The Chair reviewed the proposed agenda, including a revision to include a SA Ballot Review under New Business. The Chair noted that the unapproved minutes from Spring 2019 SC meeting had been posted on the SC Transformer Committee website. A motion to approve the revised agenda and to approve the minutes from the Spring 2019 SC meeting was made by David Walker and seconded by Klaus Pointner. The revised agenda and the minutes from the Spring 2019 SC meeting were approved unanimously.

### **D.2 Chairs Remarks**

Chair started the meeting by recognizing outgoing Dry-Type Subcommittee Chair Chuck Johnson for his 17+ years of service as Chair, noting that Chuck had also been recognized at this meetings Awards Luncheon.

Chair explained that this meeting would not use paper rosters but would instead rely upon the electronic badging system. Jerry Murphy reminded everyone that attendance would still need to be entered into the AMS system. David Walker explained that electronic badge system may not be totally foolproof, as three people present at his 12.91 meeting had not been properly recorded in the system.

Chair reviewed importance of submitting WG and TF minutes on time, and noted that the Dry-type SC meeting minutes are due by December 15, 2019. He also reviewed guidelines regarding transition from guest to member in the Dry-type SC as well as rules for keeping your membership in good standing.

Chair reviewed information related to IEEE copyright policy, including information and description of various links that may be accessed to learn more on the subject. A discussion regarding what types of information that may be subject to IEEE copyright enforcement as well as information related to the definition of individual and original authors ensued. Chair reminded the group that if you wish to present **any** text to a WG/TF you must have copyright permission from the original author.

- Includes all IEEE documents such as drafts, standards, guides, recommended practices, white papers, etc.
- Includes all standards and drafts external to IEEE such as IEC, CIGRE, CSA, UL, etc.
- Includes all published papers and presentations
- Includes anything you can find on the internet or printed on paper
- The only exception is if you write it yourself and it has not previously been published

### **D.3 Working Group/Task Force Reports**

The next order of business was the presentation of the reports of the various working groups and task forces. See the following sections for the individual reports:

#### **D.3.1 Revision of IEEE PC57.12.01 - Dry Type General Requirements Chair Casey Ballard**

Casey Ballard, Chair of IEEE PC57.12.01 gave the status report for this document.

The working group met in the Marion (2) Room of the Hyatt Regency Columbus Hotel on Monday October 28, 2019.

The meeting was called to order at 1:45 PM by Chairman Casey Ballard.

Chairman made opening comments.

WG Roster was distributed and signed. Participants introduced themselves.

The meeting was convened with 38 participants, 19 of them are members. Quorum was reached (22 current members). 3 guests requested membership, but will not be added as the decision in the meeting was to move to SA ballot. The attendance will be reported in the AMS.

The Agenda was approved unanimously being no negative votes (moved by C. Johnson and seconded by J. John).

The Minutes of Spring 2019 Anaheim meeting was approved with 1 member abstained (moved by D. Walker and seconded by R. Wicks).

The chair made a call for known patents and took some time going over the IEEE guidelines on the patent disclosure. No patent related issues were claimed.

The chair made a copyright issues request and showed the copyright slide; no copyrights claims were made.

#### **Old Business**

- Chair reviewed the changes that in the Draft 7 of the standard revision.

The following revisions discussed in the previous Fall 2019 meeting were incorporated into Draft 7 and circulated to the WG members prior of the meeting:

- Parallel operation in 4.2.6 r

V. Tendulkar suggested to add the phase shifting transformers in the list of transformers – Chair recommended to submit a comment in the SA ballot process.

- Short Circuit thermal calculation in 7.1

The new proposed IEC method was included as Method B . WG discussed the fact that this method has not yet been published in IEC and the WG chair shall clarify the copyright procedure in this case. The chair mentioned one more case worth clarifying: the IEC permission was received to use IEC PD test description in IEEE C57.12.01, but now it moved to IEEE C57.12.91 – is the IEC permission still valid?

- Routine, design, other tests in 8.3

Discussed some editorial changes, the editorial changes can be submitted and could be considered before balloting.

- Impedance tolerances in 9.2

C. Johnson commented on the need to better define what third winding means in the 3-winding transformer. A. Narawane commented that impedance tolerance is related, mostly, to the manufacturing tolerances and any third winding would potentially increase the manufacturing tolerances compared to 2-winding transformer.

- Additional comments

- o M. Kumar commented that Duke Energy has bought 100 kV dry-type transformer

(European OEM) and he was asking whether this voltage level shall be included in the standard. As with other new technical questions, Chair recommended to submit all additional comments in the SA ballot process.

- o Chair informed that some other editorial comments have been submitted and they will be

considered prior to the SA ballot.

### **New Business**

- WG has completed the discussion and changes that we had to justify the revision PAR and all other issues brought during the WG work on the revision. We have no major issues left. Draft 7 has been submitted to the WG in advance of this meeting.
- J. Tedesco proposed a motion to submit Draft 7 of the revision to Dry Type Transformers SC for approval (seconded by D. Walker). In the discussion, the Chair reminded that SC will consider whether the process was followed correctly by WG and will vote on the recommendation to move the document to the SA ballot process. There were no additional comments and motion was approved: 17 members voted to approve (77% of the membership present which meets the supermajority requirements), 2 members abstained.
- D. Walker proposed the motion to form Comment Resolution Group (CRG) in order to resolve SA ballot's comments and don't need a vote of WG for that resolution. R. Wick seconded the motion. Discussion: D. Patel asked what happen if members would not agree with the CRG decisions. The Chair responded that, in this case, the member would vote negative during the SA ballot re-circulation process. It's critical to sign up to the balloting pool. Malia explained that the negative vote shall have a comment and suggestion to be considered. CRG will try to resolve all comments. A balloter can submit the negative during the re-circulation only on the portion that has been changed during the SA ballot. The approval doesn't require 100% positive votes. WG voted on the motion and motion passed unanimously.  
D. Walker then has amended the motion and add that the WG delegate to CRG also a decision to go to the re-circulation of the document that includes the resolved comments. R. Wicks seconded the motion. There were no comments and WG approved the motion by 18 votes for and 1 vote abstained.

- The CRG was formed with the following members to volunteer: J. Tedesco, D. Walker, J. John, D. Patel, A. Levin, C. Ballard, C. Johnson, M. Iman, R. Montpool.
- The Chair will propose the motion to the Dry-Type Transformers SC on Wednesday.

**At this point within the Dry-type SC meeting Casey Ballard proposed that the DTSC vote to approve the WG recommendation to move the document to the SA ballot process.**

**Motion to approve the WG recommendation to move the document to the SA ballot process was made by Mike Iman and seconded by David Walker. The motion passed unanimously with 15 voting to approve with no negative votes or abstentions**

- Chair final remarks:
  - Next Spring 2020 meeting: Charlotte, North Carolina, March 22 – 26, 2020. WG will plan to have a meeting in Charlotte.

With no further business, the meeting was adjourned at 3 PM.

Chairman: Casey Ballard

Secretary: Sasha Levin

### **D.3.2 Revision of IEEE PC57.12.60 - Dry Type Thermal Aging      Chair Roger Wicks**

Roger Wicks Chair of PC57.12.60 gave the status report for this document. Roger noted at the onset of his report that the that the work of the WG is now complete and it is expected that the new revision of this document will be published early next year.

The WG met on October 29, 2019 at 1:45PM in Morrow room of the Hyatt Regency Columbus Hotel. The meeting was called to order at 1:45 PM by Chairman Roger Wicks. Introductions were made and attendance sheet was circulated.

The meeting was convened with 25 people in attendance. 13 of the 22 active members of this working were present. Quorum was reached. The Chair did not entertain request for membership as ballot has been completed and document revision is complete. The attendance will be reported in the AMS. After using the Cloud in hand data, there were 13 members and 14 guests for a total of 27 people in attendance.

The Chairman reviewed the proposed Agenda with the friendly modification to include new IEEE Copyright slides. Chair asked for a motion to approve the agenda as well as the unapproved meeting minutes from 2019 Spring meeting in Anaheim. Motion to approve the modified agenda and approve 2019 Spring meeting was made by Vijay Tendulkar and seconded by Dhiru Patel. With no discussion requested the agenda and approval of spring minutes was approved unanimously.

The chairman presented slides pertaining to essential patent claims (no issues were noted), IEEE copyright conformity and meeting guidelines.

The Chair informed the WG that the document is complete and has been submitted to RevCom. Stated that today's meeting would be used to summarize the steps taken to complete this revision and to review in more detail some of the key items associated with the revision that due to length and detail may not be allowed at the larger subcommittee meeting.

#### **Survey Results (D2.2)**

- This input was provided to the working group in Anaheim.

- Good input received from both working group members and guests. Chair commented that some of the non WG comments can sometimes be “more interesting” due to a different perspective.
- 187 comments received, most of which were editorial in nature. All of the comments were reviewed, and with only a few exceptions were included into the revision.
- This document then became the document balloted using the IEEE-SA process.

### **Key items changed during revision due to survey ballot**

The Chair identified three key items that were changed in the draft document based on comments received during the survey. They included:

- Clarification of terminology – improved description of test objects for consistency through document.
- Tying the test conditions to those called out in IEEE C57.12.01 and IEEE C57.12.91
- Reordered the document to have full procedures listed for both the full-size transformer coils and the representative small-scale model coils. This was a more vertical way of discussing each procedure, and although it made the document longer to repeating of certain clauses, it made the document more easy to follow

The chair noted that the standard was much improved as to allow people who may not routinely perform these types of transformer test more easily understand and follow the correct procedures

### **IEEE-SA Ballot Results (D4.3)**

- 79 people in the ballot pool
- 187 comments received (same number as with working group survey)
- Ballot was successful [more than 75% return rate (87%) and 75% affirmative (87%)], but there were 8 negative votes with comments, which included 56 comments which had to be addressed.
- Many of these comments were items from non-working group members, or were those which were not addressed as a result of the survey ballot (known concerns).
- Editorial comments were first addressed, and then a comment resolution group met to resolve the significant technical issues

### **Key items addressed by the Comment Resolution Group (CRG)**

- Updated Clause 5 to deal with 3 issues – allowing 0.99 correlation coefficient at 4300 hours, requiring 30 °C range of test data, and referring Annex C (aging examples) as it relates to different insulation systems types and how it might affect the times/temperatures used in the aging. Added paragraph at the end of the first example on short aging times on how this might be impacted as a result.
- Updated the leakage current discussion on applied testing. This information may provide trending information useful to the test program.
- Eliminated Annex B and Annex C (historical testing methods and historical models).
- Added to the reporting section for all the information added during this revision.
- Improved CCT (sealed tube) test description.

- Compromise for representative small-scale models including a required electrical screening test with (reduced) number of models required to 5 from 12. (These model inclusions are reasons why all of the negative ballots were not resolved in the final recirculation.

#### **IEEE-SA Recirculation Results (D4.4)**

- 79 people in the ballot pool
- 0 comments received
- Ballot was successful [more than 75% return rate (88%) and 75% affirmative (95%)], but there were still 3 negative ballots
- As these negative ballots were maintained, but not added on to (no new technical comments), the ballot is final. Resolution was attempted, and a consensus was reached.
- Solomon Chiang inquired if the negative votes were received from non WG members. Chair stated that negatives were from WG members.

#### **Next steps and final comments**

- The document has been submitted to Revcom for consideration in their January meeting.
- Will be working with the editor in the next month to get the document ready for publication.
- The Chair stated that the working group's work is complete and extended his thanks to all that contributed to this revision. He stated that the document is much easier to follow and understand compared to previous revision, and a very important addition of how to modify or change a system is now included.
- Likely next revision would start in the 2025 to 2026 timeframe, and Chair looked forward to passing the torch to the next WG Chair.
- Chuck Johnson expressed his thanks to the Chair and others who helped work on this revision. He observed that there was significant "give and take" by the WG members in order to achieve this successful revision.

This WG will not meet again

Meeting was adjourned at 2:15PM.

Notes prepared by Dave Stankes.

Chair: Roger Wicks

Co-Chair: Dave Stankes

#### **D.3.3 Revision of C57.12.51 – Ventilated Dry-Type Power Transformers – Sanjib Som**

No report given as WG did not meet. The document is published and the PAR has been closed.

**D.3.4 Revision of IEEE PC57.12.91 - Standard Test Code**

**Chair David Walker**

David Walker Chair of PC57.12.91 gave the status report for this document.

Chair: Dave Walker

Vice-Chair: Tim-Felix Mai (absent)

Secretary: Joe Tedesco (not official, acting only as note-taker due to Tim-Felix's absence)

The working group met in the Fairfield Meeting Room on 10/29/19. The meeting was called to order at 4:46 PM.

There were 14 members and 17 guests. There was a quorum (14/17: 82.3%). This was a quorum and allowed the Working Group to conduct business.

Dave Walker reviewed the agenda. Chuck Johnson motioned for the agenda to be approved. Casey Ballard seconded the motion. There was unanimous consent and the agenda was approved.

The slides for patents and copyright issues were presented. There were no essential patent issues identified by any attendee. Other IEEE guidelines were also reviewed.

Dave asked if anyone wanted to review the minutes from the Spring 2019 meeting in Anaheim. No one did. Vijay Tendulkar motioned that the minutes be approved, with Ken Klein seconding the motion. There was unanimous consent and the minutes from Anaheim were approved.

Old Business:

- Dave mentioned that his plan was for this to be the last meeting before going to ballot. As such, he described changes to the previous draft, namely a variety of minor editorial corrections and changes to the section of 50/60 Hz no-load loss conversion.

New Business:

- The first piece of new business concerned the exponent values given in the equations dealing with correction factors to temperature tests. The exponents change depending on the type of unit. Dave pointed out that the exponents were historical, and no one knew why they were chosen or whether they were correct, but they were obviously used for a reason.
- Dhiru Patel then presented findings from experiments that he led, trying to determine if the exponents were correct. He had looked at the exponents in Clauses 11.7.1, 11.7.7, 11.8.3, and 11.8.6. The experiments performed involved temperature testing and Casey asked about the repeatability of the temperature tests. Dhiru responded differences between subsequent tests were within the margin of error of the calculations. Based on the data he showed, Dhiru proposed to make the following changes to the standard:
  - For core & coil only,  $n = 0.8$
  - For a transformer in a self-cooled ventilated enclosure,  $n = 0.95$

- For a transformer in a self-cooled non-ventilated enclosure,  $n = 0.95$
- For a transformer, force cooled in a ventilated enclosure,  $n = 1.0$
- Dave asked if more data was necessary before making the change in the standard. Joe Tedesco asked if it was decided that more data was necessary, would that keep the standard from proceeding. Dave responded that his plan would be to table the matter until more data was gathered and make the changes, if necessary, during the next revision of the standard.
- Vijay Tendulkar asked about the effect of errors in no-load vs. load loss measurements and what their magnitude might mean. Casey Ballard raised the point that a more accurate value of  $n$  gave results that were more beneficial to customers, but potentially less beneficial to manufacturers. Chuck Johnson discussed how the types of units built across the industry globally needed to be considered. Ultimately, the discussion centered on the need for more data, which Dave agreed with.
- Dhuru Patel made a motion to make the changes he proposed. There was no second, so the motion was tabled.
- Vijay Tendulkar asked where the data would be kept, and Joe Tedesco asked if the data could be kept in an annex. Casey Ballard responded that data from multiple manufacturers could be kept in an annex. Chuck Johnson pointed out that any data from manufacturers would have to be blind and contain nothing to indicate which manufacturers had built the units.
- Dave asked for volunteers to perform these experiments. Representatives from MGM, Siemens, Hammond, and ABB agreed, with Federal Pacific being a maybe. Casey Ballard pointed out that the call for volunteers could be made at the subcommittee meeting, where more companies would be represented. Dave agreed that this was a good approach and said that he would make a template for reporting the data, which he would distribute in about 2 weeks. Casey Ballard volunteered to compile the data.
- The second piece of new business concerned the section of methods to perform the ratio test. Dave pointed out that the section does not refer to some methods that are currently being used. There was much discussion regarding what methods are currently being used. Dave proposed not eliminating any methods that are currently listed (although the C57.12.90 working group is moving older methods to an annex), but just adding language about electronic ratio/phase measurement meters and describing them. There was much discussion about the proposed wording, and the wording was revised and simplified to reflect the opinions of the working group. Dave displayed the current text showing that the other methods (that are more complex) have text and figures to illustrate them, meaning that the paragraph about the new method is an appropriate addition.
- Casey Ballard made a motion to add the new method with a second from Vijay Tendulkar. There were 14 votes in favor of the motion, which passed.
- Dave then discussed how the PAR will expire at the end of 2020. His original plan had been to freeze the draft (Draft 3) following the Spring 2019 meeting, but did not do so, electing to include changes that had been discussed after the draft was distributed via e-mail. Now, he proposed to vote on sending the draft that he presented at this meeting (Draft 4), with the minor corrections agreed to at this meeting, for approval to begin the ballot process.
- Casey Ballard made a motion to send Draft 4, with the changes agreed to at the meeting, to the subcommittee for a vote to go on to the ballot process. Vijay Tendulkar seconded the motion. There were 14 votes in favor of the motion, which passed. Casey Ballard then explained about the process of making the motion within the subcommittee to move the draft forward.

**At this point within the Dry-type SC meeting David Walker proposed a motion that the DTSC vote to approve the WG recommendation to move Draft 4 of the document to the SA**

**ballot process. Motion was seconded by Jim Antweiler. The motion passed unanimously with 16 voting to approve with no negative votes or abstentions.**

- Dave then discussed the need for a Comment Resolution Group (CRG). He proposed that we form a CRG that had the authority to deal with all comments without having to return to the working group for approval. Joe Tedesco made the motion and Jim Antweiler seconded it. There were 16 votes in favor of the motion, which passed.
- Dave solicited volunteers for the CRG and received the following volunteers: Dave Walker, Joe Tedesco, Mike Iman, Rhea Montpool, and Chuck Johnson.
- Chuck Johnson requested a copy of Dhiru's presentation. Dave said he would send out the presentation to the members of the working group after Dhiru had removed some company-specific information from the presentation.

The next meeting of the working group will be at the Spring 2020 meeting in Charlotte, NC.

The meeting was adjourned at 5:58 PM.

### **D.3.5 IEEE PC57.16 – Dry Type Reactors**

**Chair Art Del Rio**

Art Del Rio Chair of PC57.16 gave the status report for this document.

The working group for the revision of C57.16 met in the Fairfield room of the Hyatt Regency Columbus Hotel on Monday October 28, 2019, at 9:30 AM.

#### **1. Introductions and Call for Patents and copyright info**

- The meeting was called to order at 9:30 AM by the WG Chair Art Del Rio.
- The meeting was opened with the introduction of participants.
- The WG Chair, Art Del Rio, did a call for potentially essential patents. None was reported.

#### **2. Circulation of Rosters**

- The attendance rosters were circulated.

#### **3. Verification of Quorum**

- There was a total of 23 participants: 9 Members and 14 Guests out of which 1 guest requested membership, granted based on attendance.
- 9 of the current 15 WG Members were present and quorum to carry out business was met.
- The meeting agenda, which was circulated by email among members and guests on Oct 25, 2019 by email, was presented to the participants.
- There were no objections or comments and the agenda was approved unanimously.

#### **4. Approval of the minutes of the March 25, 2019, meeting in Anaheim, California.**

- The minutes from the S19 meeting in Anaheim, which were circulated on October 15, 2019 by email, were presented to the participants.
- There were no objections or comments and the minutes were approved unanimously.

## 5. Continued discussion and review

- We will need more time for this revision and the WG Chair, Art Del Rio, will request a PAR extension.

### 5.a Annex B - Dry-type air-core shunt capacitor reactors. Update on TF from Switchgear Committee. Dave Caverly

- At our Anaheim meeting (March 25, 2019) we discussed the possibility to form a liaison task force with the Switchgear Committee for the update of Annex B and F of C57.16. Dave Caverly was tasked to investigate the possibilities for this at the upcoming spring Switchgear meeting in Burlington, Vermont (April 30, 2019).
- At this meeting in Columbus, Dave Caverly gave an update presentation regarding the activities in this regard. Summary: The “discussion meeting” in Burlington led to a motion and approval within the HVCB Subcommittee to establish a C57.16 Liaison Task Force. Dave Caverly is Chair of the Liaison Task Force (LTF), Secretary is Lucas Collette. The inaugural meeting of the Liaison Task Force (LTF) was held in the subsequent Fall Switchgear meeting in San Diego (Oct. 8, 2019). (It was subsequently determined that the sponsorship of this LTF should be moved from HVCB to ADSCOM. It is planned to formally do this in the spring 2020 meeting.)
- The main topics from the LTF and the discussion in our meeting are listed below:
  - In our standard, we should not go too far into the Switchgear Committee area. We should mostly alert the user, make him/her aware of the topics and history regarding the basic requirements, such as what is behind the reactor inductance ratings; provide some explanations and then give references to the switchgear documents for the user to find the current details (which have and will continue to evolve). For short thermal short circuit and mechanical peak ratings, the principles should be illustrated with examples as these aspects are not well explained in the existing reactor standards, nor in the switchgear standards and guides.
  - We will make minimal change to the existing normative Annex B and then provide tutorial/informative material in a separate informative Annex eg. Annex B-1 which refers to switchgear standards and guides and other relevant references. Action Dave Caverly
  - The above approach was discussed in the San Diego meeting and proposed to the attendees. The Chair of the LTF asked the Switchgear attendees if there was any objection to this approach. There was no objection.
- Dave Caverly presented a draft outline of the proposed informative Annex B-1 and agreed to move it forward in advance of our Spring meeting. Pierre Riffon agreed to support in respect of drafting a summary of the neutral side arrangement of capacitor reactors and related pros and cons. Dave asked the group if this was a good approach and if there were any objections to the proposed approach. There were none.
- Users do often ask for PI models of the reactors that they can use in their system studies. The question raised within the LTF at Switchgear was: “Can that information be provided on nameplates or on outline drawings as a standard supply – and be so delineated within the reactor standard?” This question refers not only to Annex B Capacitor Reactors but also to the complete C57.16 Series Reactor Standard; Current Limiting Reactors, Filter Reactors and so on (and even Shunt reactors which are not covered by this standard). This topic was discussed at some length in our Columbus meeting. One difficult aspect of the whole subject is that the capacitance to ground – a key element of the desired model, depends on the mounting arrangement (height of the coil above the ground plane), which is not always known to the reactor supplier. The conclusion in the WG in Columbus was that it should not be either nameplate or standard drawing data but rather provided in separate documents if requested. We also discussed the possibility of adding a template of required information (such as planned mounting arrangement) that the user would need to provide in order for the reactor supplier to provide the requested information. This could also be left as an issue to be settled between supplier and customer

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at time of order. Some felt that the manufacturer should only give data for the reactor and that the system designer should add capacitances e.g. to ground and between phases based on distances. No clear conclusion was arrived at and this topic should be again reviewed in our next meeting with specific motions as to what to do based on specific proposals.

- There was some discussion and an update from Dave Caverly about how the circuit breaker requirements are evolving (and therefore changing the required sizing (inductance) for shunt capacitor reactors (TLI's). For decades the limits have been stated in terms of peak current, rate of rise (or 'I<sub>xf</sub>') and maximum frequency. These limits were originally established based on oil circuit breaker capabilities.
- Both IEC and IEEE have such limits however the actual figures are not identical. The 'I<sub>xf</sub>' requirement was abandoned by IEC. Within IEEE there are current discussions in the C37.012a working group to substantially increase the allowable 'I<sub>xf</sub>'.
- We should consider adding some IEC informative information into Annex B-1. Written approval would be needed.
- We should also consider reference to Cigré A3.38 "shunt capacitor switching topics".

### **5.b Annex F - System considerations, TRV section update; feedback from Switchgear Committee. Dave Caverly**

- Dave Caverly presented the current status with the LTF and the proposed way forward: There is an existing proposed re-draft of the present Annex F. The existence of this new draft was discussed at the LTF meeting in San Diego and 4 members of the Switchgear LTF agreed to review and comment on it by Dec 31, 2019. It will shortly be distributed to the LTF Switchgear community (members and guests).
- The intention is to review the above-mentioned comments from the switchgear folks at the spring 2020 Transformers Committee meeting, and then subsequently, along with the results of the discussions at the Transformers WG Spring meeting, at the Spring Switchgear Committee meeting.

## **6. New Business**

- There was no new business.

## **7. Adjournment**

- The meeting was adjourned at 10:44 AM. Next meeting will take place in Charlotte, NC, March 22<sup>nd</sup> to the 26<sup>th</sup>, 2020.

Respectfully submitted,

Chairman: Art Del Rio ([a.delrio@ieee.org](mailto:a.delrio@ieee.org))

Secretary: Ulf Radbrandt ([ulf.radbrandt@ieee.org](mailto:ulf.radbrandt@ieee.org))

### **D.3.6 IEEE PC57.124 – Dry Type Partial Discharge Guide Chair**

**Tom Prevost**

Date and Location: 10/29/2019 at 8:00 AM in Morrow Room at Hyatt Regency Hotel in Columbus, Ohio  
16 Members were present out of 22 in WG. A quorum was achieved.  
23 Guests of which 3 requested membership.

Meeting was called to order at 8:00 am by Chair Tom Prevost.

1. This was followed by welcome and some general remarks about scope of the work of this WG.
2. Introduction of attendees took place at 8:02 am.
3. The agenda slide was revised by the chair to include a discussion and presentation of the IEEE SA copyright policy. A motion was made by Joe Tedesco, seconded by Detlev Gross to approve the revised agenda. The motion passed unanimously.
4. A motion was made by Domonique Bollinger, seconded by Roger Wicks to approve the minutes of the last CPC57.124 meeting held in Anaheim. The motion passed unanimously.
5. Patent slide was displayed by the Chair. There was no essential claim essential presented by any attendee.
6. The IEEE SA copyright slides were shown to the WG by the chair. This resulted in significant discussion and concern. Detlev Gross stated that he is working on a similar document in the Dielectric Test Subcommittee, PC57.113, which covers PD in liquid filled transformers. He was informed that we will need a copyright release to use similar wording in each document. After lots of discussion, the Chair said that he will work with the IEEE SA staff to clarify the new rules and this should not impede the technical work required to write the guide. The purpose of this project states explicitly that we plan to make this guide align with IEC 60270. Thus we need to assure that we can do this in adherence with the copyright rules.
7. The current document, C57.124 will reach its ten year limit at the end of 2019. There was discussion as to what will be the status of this document after 2019. IEEE SA staff, Melia Zaman, stated that as long as there is an active PAR the document will not be made inactive.
8. Review of Task Forces
  - 8.1 Task Force 1, Normative Reference, Definitions etc. Casey Ballard Chair Casey indicated that it is still early for him and he has no draft yet. As soon as there is some technical content to the main body of work he anticipates that he will have enough information to start writing.
  - 8.2 Task Force 2, PD Detection and Systems Test Procedures- Detlev Gross, Chair New doc will be generated in concert with document from C.57.113 chaired by Ali Naderian to simplify work of this WG. Difference between the two documents from these respective groups will focus on:
    - 1) Frequency range
    - 2) Noise floor
    - 3) Calibration TechniquesThe chair asked Dr. Gross to have a draft ready for the next meeting. There will be time in the agenda for the presentation of this draft.
  - 8.3 Task Force 3- Annex, Raja Kuppuswamy Chair There was some discussion as to what should be placed in the annex versus the main body of the document. This needs to be further defined. The chair reminded the WG that we need to stay within the scope of this project.
  - 8.4 Task Force 4- Bibliography – Chair Jagdish Burde  
No update available. Jagdish Burde will work with Tom Prevost’s help to compile this topic.

9. New Business New business topic was the copyright issue. The chairman stated that he will work with the chair of PC57.113, Ali Nadirian along with IEEE SA staff to assure that we can do our work and comply with the copyright requirements.

11. TF agreed that they would meet again at the Spring 2020 meeting.

12. Meeting Adjourned at 9:03 AM

**D.3.7 IEEE PC57.12.52 – Task Force for Sealed Dry-Type**

**Chair Joe Tedesco**

Joe Tedesco Chair of PC57.12.52 gave the status report for this document.

The Task Force met in Marion Room on 10/28/19. The meeting was called to order at 11:06 AM by Chairman Joseph Tedesco.

The patent call was given. No one replied with any patent issues.

16 Working Group members. 9 are present. A quorum was achieved.

Motion to approve the minutes: Casey Ballard, Second: Vijay Tendulkar. Motion passed.

The agenda was approved unanimously. Motion: Colby Lovins, Second: Casey Ballard

J. Tedesco reminded us that the title approved in Anaheim is: “IEEE Standard for Sealed Dry-Type Distribution and Power Transformers”.

Chair brought up issue about whether SF<sub>6</sub> should be included as a fill gas in addition to Nitrogen and Dry Air. Previously there was concern about lack of SF<sub>6</sub> expertise in the working group. Chuck Johnson pointed out that there were other insulating gasses besides SF<sub>6</sub>. C. Ballard mentioned that other gasses might require changes in gaskets and other materials used in the transformer. V. Tendulkar and others asked why we should be concerned about other gasses? C. Johnson pointed out that having a Standard does not preclude using other gasses. Chair asked for a motion to include other insulating gasses. No motion was proposed to include gasses other than Nitrogen or air so the issue was tabled.

PAR-Scope: Options for Scope are to list all type exceptions (transformer types) to scope (similar to C57.12.01) or just reference the scope to C57.12.01. According to Malia Zaman it is acceptable to reference another Standard’s scope. J. Tedesco displayed the two options. There was discussion about the various exclusions and whether they should be included. V. Tendulkar suggested removing non-ventilated, pad mounted, and ventilated from the exceptions list. Discussion about the definition of “sealed” versus “ventilated” then happened. C. Ballard moved that Option 2 (adoption of C57.12.01 exceptions list) be adopted, V. Tendulkar seconded. No further discussion. Unanimous approval of motion to adopt C57.12.01 exceptions list.

PAR- Purpose: Chair proposed deleting references to frequency, # of phases, # windings, kVA, step down usage from the existing purpose. V. Tendulkar suggested that a frequency was needed. Aniruddha Narawane suggested that the word “certain” is not correct. Suggestion to change the purpose to: “This standard describes electrical and mechanical characteristics of sealed dry-type power and distribution transformers. This standard will accomplish this by presenting basic electrical and mechanical requirements and describing other requirements or alternatives that may be specified for some applications.” Discussion on simplifying the purpose led to the suggestion for the purpose: “This standard describes electrical and mechanical characteristics and requirements of sealed dry-type distribution and power transformers.”. Colby L. moved to accept the previous proposal, V. Tendulkar seconded. Unanimous approval.

Chair started the discussion on changing the Standard text in Section 5.1. C. Ballard suggested to comparing to text to C57.12.51 that was recently published that had similar headings and text. C. Lovins and Shawn Nunn volunteered to do the comparison to C57.12.51-2019.

Chair adjourned meeting at 12:12pm

The Task Force will meet again at the Spring 2020 meeting in Charlotte, NC.

Chairman: Joseph Tedesco

Secretary: David Walker

**D.3.8 IEEE 259 – Low Voltage Thermal Aging      Chair David Stankes**

Chair: Dave Stankes

Vice-Chair: Joseph Tedesco

This was the second meeting of the task force. The ad hoc meeting was held in the Champaign meeting room and was called to order at 9:35 AM.

There were 4 people present in person and 1 person present via phone. All 5 attendees were members. Given that the task force has 6 members, there was a quorum (83%) and business could be conducted.

The agenda was approved. The patent and copyright slides were shown. The minutes were reviewed and approved.

Old Business:

- Dave Stankes provided an update on the work that had been proceeding between himself and Joe Tedesco since the Spring 2020 meeting. They had conducted three teleconferences to process changes to the document.
- There are potentially interested parties that are not members of either the task force or of IEEE, but that would have valuable input. Two people so identified were Ed van Vooren (head of Eltek Labs) and Bill Simpson (long time chair of IEEE 259). Casey Ballard pointed out that to share the draft with them, the task force will need to complete the appropriate paperwork to comply with the new copyright policy.

New Business:

- Dave and Casey both described the plan to bring IEEE 259 in line with C57.12.60, IEEE 98, and IEEE 99.
  - Dave described how, at one time, IEC 61857-41 was considered as a possible source of information, but Joe had previously contacted Malia Zaman and found out that it would be problematic to explicitly use the language of an IEC standard.
    - There was further discussion about 61857-41 still being in the draft stage. Tim-Felix Mai and Joe briefly discussed the latest vote taken on 61857-41 and what it might mean, before the discussion returned directly to IEEE 259.
- Roger Wicks pointed out some of the current requirements in IEEE 259 that may be different from the way that UL 1446 is generally performed.
  - Materials to be tested in the form that they will be used in the system (e.g., if a 10 mil paper would be used in the actual system, a sample of 10 mil paper must be tested, not a sample of 3 mil paper).

- Thicknesses and creepage distances should be suitable for the intended voltage class of the system.
- The standard suggests that only materials be tested that have “life data.”
  - Roger pointed out that the revision will need to define what is meant by “life data.” Is it only data from thermal testing or would service records count as well?
- Roger also discussed the temperature tables in C57.12.60 and IEEE 99, pointing out that a cleaned up version of the table from 99 would probably be the most appropriate for use in 259.
  - Casey reminded that this would require the task force to contact SCC 4 due to copyright issues.
- Roger also discussed how they needed to ensure the tables will work for different halving constants, which will be consistent with C57.12.60 and 99.
- Casey brought up the need to have the task force on the schedule next meeting, to avoid having another ad hoc meeting. The ideal spot would be the time slot vacated by C57.12.60, since that work is complete. This would require Dave to send an e-mail to Jerry Murphy requesting the time slot and copy Casey (as subcommittee chair) and Roger (as C57.12.60 chair).
- Dave discussed the previous PAR; his plan was to submit it prior to the October 13 deadline. The title would remain the same and the scope would remain largely the same, except for changes to some of the dates of referenced standards.
- Casey pointed out that the task force would not become a working group until after the PAR was approved, which Casey meant that Dave would have to request at the subcommittee meeting that the task force be continued for another one or two meetings.

The date of the next meeting was not explicitly set, but it would be in Charlotte, NC at the Spring 2020 meeting. The current meeting was adjourned at 10:30 AM.

Following the reporting of the minutes, David Walker raised the question regarding the relevancy of this low voltage electrical insulation test standard, as the IEEE standards pertain primarily to higher voltage transformers. Roger Wicks explained that the standard is referenced in IEEE C57.12.60 to address the low voltage coils that may be present in a medium voltage transformer.

Dave Stankes requested and was granted a six month extension to the TF in order to continue the development of a PAR for the revision of the document.

## **D.4 Old Business**

### **D.4.1 Status of Standards**

Chair reviewed status of documents controlled by the DTSC. Noted that the list of documents and their status are listed on the Transformer Committee website.

Several of the documents are listed as inactive and are in need of revision, and Chair took the opportunity to solicit volunteers to work on these documents.

- TF for the revision of IEEE C57.134 (Rev. due 12/31/2023)
  - Chair - Colby Lovins
  - Vice Chair - Vacant
  - Secretary - Juan Pablo Medina
  - Volunteers (Joe Tedesco, David Walker, Aniruddha Narawane, Shawn Nunn, Ken Klein)

Tom Prevost offered to refer Colby Levin to the appropriate documents pertaining to temperature sensors.

- TF for the revision of IEEE C57.96 (Rev. due 12/31/2023)

- Chair - Aniruddha Narawane
- Vice Chair – Mike Iman
- Secretary – Kerwin Stretch

Rick Marek offered to talk to the TF regarding topic of copyright pertaining to this document. Rick also suggested to widely advertise the work on this document as it is an important Users document.

## **D.5 New Business**

### **D.5.1 SA Ballot Overview**

The Chair reviewed correct procedures to be followed during a SA Ballot, including recirculation votes. Comments regarding recirculation vote was raised by Solomon Chiang, and it was noted that in a recirculation you don't need to vote again if you are not changing your vote. Joe Tedesco commented that in order for a negative vote to be accepted it must be accompanied with a comment. Chair noted that it is not possible to carry on a negative vote without adding additional comments as original comments are erased after first ballot. Chair presented a list of SA Ballot reminders including:

- Make sure you are a member of both IEEE and SA
- Select your areas of interest to receive ballot pool invitations
- Register for the ballot pool before the time indicated in the email (if you don't you can't be added later on)
- If you see a need for a modification to the proposed draft make sure you include comments
- A negative vote without comments gets no consideration
- Comments that do not make a suggestion or proposal for change may result in no change at all

### **D5.2 Phil Hopkinson offered two new business items.**

- Low Voltage Standards – Phil raised the question of whether or not NEMA ST1 and ST20 (low voltage) standards should be brought under the umbrella of IEEE. Phil provided historical background regarding how years ago the Medium Voltage standards controlled by NEMA were moved over to IEEE while control of Low Voltage (LV) standards remained under NEMA. Phil how many of the NEMA members present at the meeting would be interested in having these LV standards brought into IEEE. All of the NEMA members present said they would be interested. David Walker offered to approach NEMA to see if they would be interested in pursuing this. Mark Gromlovits suggested the request to NEMA would perhaps carry more weight if it came from a larger body instead of an individual request. Joe Tedesco asked if there were perhaps other standards (other than ST1 and ST20) that should be considered. The Chair stated that the DTSC was not endorsing this request to approach NEMA at this time.
- Topic regarding Special Termination Lighting Impulse testing – Phil commented that when one performs impulse testing in the factory, the test is not as onerous as when testing in the field. Phil has been requesting Special Termination Lighting Impulse testing data from both liquid and dry type transformer manufacturers, and noted that Dhiru Patel from Hammond has already submitted some of this data. Phil offered to send Casey Ballard (Chair) the test description and a formal request for Dry-type members to perform test and submit data to Phil. Phil wanted the DTSC that

there is a TF meeting dealing with this subject scheduled for our next meeting in Charlotte and encouraged interested parties to attend.

**D.6 Adjournment**

With no further business, the meeting was adjourned at 2:45 PM.

Chairman: Casey Ballard

Vice Chairman: Vacant

Secretary: David Stankes

(Notes prepared by Dave Stankes)