Annex C Distribution Subcommittee – Chair: Ed Smith

October 21, 2020
Virtual

Chair: Ed Smith
Vice-Chair: Jerry Murphy
Secretary: Josh Verdell

C.1 General Opening

Ed opened the meeting welcoming everyone to the meeting. To establish a quorum, a list of members was displayed, and a quorum poll was made. We did have a quorum with 42 members in attendance by count of those identified on a slide presented in the meeting. Recorded attendance gave 133 in attendance and 44 members.

The agenda was reviewed, a motion was made to approve by Dan Sauer, seconded by Gary Hoffman, and approved by unanimous acclamation of the members in attendance.

The Fall 2019 meeting minutes were reviewed, a motion was made to approve by Phil Hopkinson, seconded by Dan Sauer, and approved by unanimous acclamation of the members in attendance.

At this time, Ed Smith reviewed the copywrite requirements.

A slide was presented welcoming the new member of the subcommittee before proceeding with the working group and task force reports.

C.2 Working Group and Task Force Reports

[redacted]C57.12.20 – Overhead Distribution Transformers – Al Traut

Al presented the following minutes from the working group meeting on October 19, 2020 at 11:45 a.m. with 56 in attendance.

1. Call to order

   The meeting was called to order by the Chair (Al Traut) at 11:00AM CDT on Monday, October 19, 2020. This was a virtual meeting via Webex.

2. There was a call for essential patent by the Chair. There were none brought forward. The Chair announced if there was one to let the Chair or Vice Chair know. The IEEE SA Copyright policy was reviewed. No issues were identified.

3. Quorum Verification

   A members list was displayed and an attendance poll was conducted. **30** of **52** members were present. A Quorum was declared. 3 guests requested membership. Total attendance was 56.

4. Approval of agenda for this meeting

   The Chair sent out the Agenda prior to the meeting for review. He requested approval of the Fall 2020 Agenda. Agenda for the Fall 2020 meeting was approved with no negative votes.

5. Approval of minutes of the previous meeting

   The Chair sent out the minutes prior to the meeting for review. He requested approval of the Minutes for the Fall 2019 meeting in Columbus, OH. The minutes for the Fall 2019 meeting were approved with no negative votes

6. Chair Report

   The Chair announced the active PAR expires 12/31/2023.

7. Old Business

   a. Discussion - Annex B section A.2 test procedures, Steve Shull discusses test method. Also proposes changing wording in Figure A.1 from "4 in. copper tubing" to "1 in. section of 4 inch Type L copper tubing".

   b. Discussion - Question from Alan Wilkes, "how long are the chains?" Steve S. responds that those lengths would be determined by tank diameter and the "B" dimension in the chart.

   c. Motion - Steve Shull moves to add this as an informative Annex. Second by Corey (Charles) Morgan.

      i. Discussion - Monty suggests using the wording "Optional Tests" as it is used in ANSI standards.

      ii. Motion 1 – 26 For, 0 against, 3 abstain, 28 no answer. Motion carries.

   d. Discussion on how C57.12.20 - Table 6 compares with Bushing Standard C57.19.02 Table 4. No motion to make a change at this time.

   e. Discussion on section 7.5.1 Covers and handholes. Point of clarification – removing handholes from the document is connected to previously removing internally mounted tap changers in previous draft.

8. New Business

   a. Discussion - Bruce Webb asks if we should add rise limits for "touch temperatures"? He suggests some limits may be added to C57.12.00. Mike Thibault recommends referring to limits in ASTM documents. R. Szewczyk makes the point that external transformer temperatures should be handle by procedure and by PPE. Marty Rave recommends stencil/decals for warning of excessive heat. Discussion will be tabled due to time restraints….

9. Next meeting - April 2021, Toronto, ON Canada.

10. The meeting adjourned at 12:00PM CDT.

[redacted]C57.12.28, .29, .30, .31 & C57.12.32 – Enclosure Integrity – Dan Mulkey

Jeremy Van Horn, for Dan Mulkey, presented the following minutes from the working group meeting on October 20, 2020 at 8:00 a.m. in with 59 in attendance.

1. Dan Mulkey called the meeting to order at 8:00 AM CST.
2. Opening remarks and announcements
    a. Dan Mulkey chastised the group as online vote / balloting was like pulling teeth – we will likely have to do this again so respond people!
    b. Dan Mulkey commented that while planned, 2021 will unlikely be held in Toronto so be prepared for more email votes and online meetings – we need to do this to get our work done.
3. Dan Mulkey reviewed IEEE SA Copyright Policy and Essential Patent Claims. No issues were raised.
4. Membership changes were noted:
    a. Changed to Guest: Jason Attard, Babanna Suresh, Giuseppe Termini, Robert Tinsley, and James Dorsten
    b. Added: Brad Kittrell, Ion Radu
5. Quorum was verified. The working group consisted of 58 members, requiring 29 for quorum. 41 members were confirmed through the WebEx poll.
6. Dan Mulkey requested approval of the agenda. Hearing no requests for changes, the agenda were approved as written.
7. Dan Mulkey requested approval of the minutes. Hearing no requests for changes, the minutes were approved as written.
8. Status of Standards:
    a. C57.12.28 Standard for Pad-Mounted Equipment – Enclosure Integrity, Published July 15, 2014
        i. Revision Due: 12/31/2024
        ii. PAR expiration: 12/31/2024
        iii. Status: PAR approved 3/5/2020
    b. C57.12.29 Standard for Pad-Mounted Equipment – Enclosure Integrity for Coastal Environments, Published August 8, 2014
        i. Revision Due: 12/31/2024
        ii. PAR expiration: 12/31/2024
        iii. Status: PAR approved 3/8/2020
    c. C57.12.30 Standard for Pole-Mounted Equipment – Enclosure Integrity for Coastal Environments, Published September 20, 2010
        i. Revision Due: 6/17/2020
        ii. PAR expiration: 12/31/2023
        iii. Status: Balloted, submitted for approval
    d. C57.12.31 Standard for Pole Mounted Equipment – Enclosure Integrity, Published September 20, 2010, Corrigenda approved May 16, 2014
        i. Revision Due: 6/17/2020

ii. PAR expiration: 12/31/2023

iii. Status: Balloted, submitted for approval

e. C57.12.32 Standard for Submersible Equipment – Enclosure Integrity, Published Aug 8, 2019

i. Revision Due: 12/31/2029

9. Old business:

a. Dan Mulkey updated the group on C57.12.31 ballot results and status

i. Email ballot was held: 39 approved CRG recommendations for the initial ballot, 0 against, and 19 abstentions.

ii. Recirculation with the modifications was initiated, CRG dealt with few new comments and with no new substantive changes.

iii. Standard submitted for approval: PC57.12.31 have been assigned to RevCom Agenda 02 Dec 2020

b. Dan Mulkey updated the group on C57.12.30 ballot results and status

i. Email ballot was held: 39 approved CRG recommendations for the initial ballot, 0 against, and 19 abstentions

ii. Recirculation with the modifications was initiated, CRG dealt with few new comments and with no new substantive changes

iii. Standard submitted for approval: PC57.12.30 have been assigned to RevCom Agenda 02 Dec 2020

c. Dan Mulkey reviewed status of standards, PAR was approved for PC57.12.28 and PC57.12.29.

10. New business:

a. Dan Mulkey presented proposed % mass loss calculation and scale accuracy for inclusion in the next revision of the standards starting with C57.12.28/29.

i. Text was taken from 4.3.2 Substrate performance requirements in C57.12.30/32 but with ‘weight’ changed to ‘mass’ and 4 significant figures added to the acceptance criteria

ii. Question was asked if this would be a corrigendum for C57.12.30/32. Dan said we can decide this later.

iii. Dan Mulkey proposed four significant figures to be required for mass measurements in Annex A, group discussed required scale accuracy.

1. Paint manufacturers confirmed 0.0001g is a reasonable measurement.

2. Tom Duzat mentioned that this accuracy may get difficult with samples greater than 0.25 inches thick.

3. Concluded we need real test results to before accepting these proposed changes.

iv. Group discussed purpose of the mass loss test and what we should look at in order to improve this test.

1. Dan Mulkey commented the purpose of the tests included in the standard is to understand what happens if the coating system completely fails (e.g. will the bare substrate sufficiently protect me from corrosion?).
2. Will Elliott has completed corrosion testing of various bare and painted substrates. Will noted that bare Cu-bearing failed the test. Full results will be presenting results in STNP TF Effects of Corrosion on Transformers at 2:20 PM CST.
3. Bob Kinner asked if there is a procedure to remove rust and corrosion products before calculating mass loss. Will Elliott and Tom Dauzat stated that the procedure requires physical removal of oxides through abrasion but recognized this can be difficult to do.
4. Tom Dauzat mentioned that with this procedure some samples had mass gain, likely due to embedding of salt in substrate material.
5. Tom Dauzat mentioned there is a solution that can be used to remove corrosion products more effectively. Jane Hall, Tiffany Lucas and Bob Kinner confirmed there are several solutions that can do this including: Oxalic acid, citric acid, and diluted HCL.
6. Zoran Goncin commented that mass loss is not an accurate representation measuring corrosion as failures are often associated with pitting or stress corrosion cracking (SCC) which can occur either due to the weld or inclusions in the steel.
7. Tom Dauzat commented that proper annealing to relieve stresses after fabrication of tanks is critical in preventing pitting / SCC.
8. Brian Klaponski commented that he has heard 304L underperforms 316L at higher temperatures. Will Elliott commented that temperature will impact corrosion rates but he does not have any data on this. Decided to discuss this further in the STNP TF Effects of Corrosion on Transformers at 2:20 PM CST.

b. Dan discussed next steps for updating C57.12.28 / 29. Current timeline means we need to finish drafts at Spring 2023 meeting.

   i. Dan Mulkey informed the group that Justin Minikel previously volunteered to convert the old standard into the new IEEE template and redline text with previously approved changes from C57.12.30/31/32.

   ii. Redlined standards will be reviewed and discussed in Spring 2021 meeting.

c. Dan requested a taskforce to be formed to review the special security tests in C57.12.28 / .29 (pry-bar, wire probe, etc). It was brought to Dan’s attention that referenced Iron Man scales No. 1756T4 seem to be obsolete / no longer available.

   i. Taskforce Members: No volunteers in the meeting. Dan will Voluntell some people.

d. Dan Mulkey asked if anybody would be interested to do some coating tests

i. Jane Hall and Chris Guertin from Cloverdale Paint volunteered. Scott Abbott from PPG volunteered. Brian Klaponski volunteered as a transformer manufacturer. Carlos Gaytan volunteered as a transformer manufacturer.

ii. Group discussed test procedure and parameters

1. Tom Dauzat suggested test samples should be prepared to mimic the transformer manufacturing process.

2. Dan Mulkey commented that the last test the group ran included samples from transformer manufacturers as well as paint suppliers.

3. Zoran Goncin commented the weld is the weakest point and should be considered specifically for pitting corrosion.

4. Tom commented we need to keep in mind the time constraint as we have 1 year to complete the tests and include results in the standard.

5. Jane Hall suggested to study the effect of temperature gradient on coatings.,

6. Martin Bachand suggested to include the Atlas Cell test for IEEE C57.12.32.

7. Scott Abbot mentioned there are other standards that have outlined test procedures such as SAE J2324 Cyclic Corrosion Test.

8. Tiffany Lucas suggested we could used different ASTM methods such as D5849 or D4587 rather than referenced D4587.

iii. Scott Abbot commented there are two key questions we need to consider when developing this test plan:

1. What do we want to evaluate: corrosion, adhesion, pitting?

2. What tests are difficult to perform and is there an easier / more accurate way to do it?

iv. Group to continue this discussion at the next meeting.

v. Dan requested a taskforce to be formed to review and propose definitions for 304L, 409L and other steels (or find a reliable reference).

vi. Taskforce Members: Tiffany Lucas, Will Elliot, Bob Kinner

11. Next meeting: is planned for April 27, 2021 in Toronto, ON, Canada

a. The following attendees requested membership and will be added to membership for the Spring 2021 meeting: Ramadan Issack.

12. The meeting was adjourned at 9:13 AM CST.

C57.12.34 – Three Phase Pad-Mount Transformers – Steve Shull

Scott Dhalke, for Steve Shull, presented the following minutes from the working group meeting on October 19, 2020 at 2:20 p.m. with 65 in attendance. Phil Hopkinson had a question regarding step up transformers and he was directed to send the question to Steve Shull for a response.

1. The meeting was called to order by the Chair at 2:20 P.M. CST on October 19, 2020 and Quorum was checked and reached.
2. Agenda approval

   The Chair displayed the Agenda for this meeting. He asked the WG for any proposed changes to the presented Agenda. No changes were offered and therefore the Agenda was declared approved as shown.
3. Minutes approval

   The Chair commented that the Meeting Minutes of the last meeting were posted on the Transformer Committee website. He also informed all WG members and guests of this in an email prior to this meeting. The Chair asked the WG for any changes to the Minutes of the last meeting. No comments were brought forth, therefore the minutes of the last meeting were approved as written.
4. Confirmation of IEEE SA Essential Patent Statement

   The Chair displayed the Essential Patent information. He informed all WG members and guests that the same information was sent via email prior to this meeting. The Chair asked for any claim of known Patents associated with this work. Nothing was brought to the Chairs attention.
5. IEEE SA Copyright Policy Statement

   The Chair displayed the IEEE SA Copyright Policy information. He informed all WG member and guests that the same information was sent via email prior to this meeting and he asked that if there are any questions on this to refer to this email.
6. Old Business

   6.1. A Task Force (TF) composed of Jerry Murphy (Chair), Jeff Schneider, Gary King, Dan Mulkey, and Suresh Babanna was created last meeting to craft wording related to comments provided by a WG Member. Jerry Murphy presented the results of the TF to the WG. The first note was proposed to be added at the end of TABLE A.1 in Section A.3. The second note was proposed to be added at the end of Section A.4. Jerry Murphy made a motion to “add or replace these notes as specified by the TF to the current working draft”. The motion was seconded by Charles Morgan. The motion 1 passed with 36 votes “For”, 0 votes “Against” and 2 votes “Abstain”. Therefore, the new notes will be added to the current working draft as presented by the TF. The Motion 1 WG members were verified.

   6.2. A Task Force composed of Carlos Gaytan (Chair), Christopher Sullivan, Tom Callsen, Igor Simonov, and Pragnesh Vyas was created last meeting to review Section A.7. The TF Chair presented the proposals of the WG. This presentation proposed the term “Cabinet” to be changed to “Pad-Lockable Boxes” or “Pad-Lockable Enclosures”. It was stated that terms “Pad-Lockable Boxes” and “Pad-Lockable Enclosures” are the most common terms used in transformer specifications for renewable energy applications. This presentation also proposed changing the

terms on Fig. A.3. Fig A.3 currently depicts the “Boxes” on the LV side of the tank. The Chair asked if Fig A.3 should also show the “Boxes” on the HV End. The TF Chair agreed and stated there were “Boxes” on the HV side of tank for “Tap Changer Handles” and “Load-Break Switches”. His presentation proposed deleting the exclusion of the application of enclosure security standards (IEEE C57.12.28). The TF Chair stated that research of user specifications did not make reference to exempting requirements of this standard with the exception of the wire probe testing. After a lot of discussion, it was decided to send this back to the TF for more work on the section. The TF would take the WG discussions and comments and develop a new proposal for Section A.7. This taskforce report will be added to next meeting Agenda to present the TF recommendations.

6.3. Complete review of remain unreviewed sections of Annex A

6.3.1. The Chair asked for comments from the WG on Section A.8. A number of editorial comments were made and incorporated into the section. A question was raised as to the need for this section. Comments were made by two manufacturers that underoil arresters are common in single phase padmount transformers and many 34.5 kV three phase padmount transformer but not normally are seen in lower primary voltage three phase padmount transformers. There was also some discussion on the failure mode of these and it was pointed out that their placement was important not to cause damage to the core coil assembly as these are not field replaceable. At the conclusion of the discussion, it was decided that this section would be retained in the document.

6.3.2. The Chair asked for comments on Section A.9.1. A few editorial comments were raised and incorporated into the section.

6.3.3. The Chair asked for comments on Section A.9.2. A question was raised as to if it was appropriate to list standards in a separate section rather than the bibliography or normative references. The Chair explained to the WG that there is a precedence of putting certain standards for specific reference when required. A question was asked if there was a need to include standards for newer type sensors? The Chair asked Israel Barrientos to search for any other standards that would be applicable and report his findings in the next meeting.

6.3.4. The Chair asked for comments on A.9.3. A number of editorial changes were made and accepted by the WG.

6.3.5. The Chair asked for comments on Section A.10. A discussion occurred as to the need for hot spot monitors in this product. Due to WG comments, the Chair issued a Poll (Labeled as Motion 2, however only a poll) for all meeting participants to “leave Section A.10 Winding Hot Spot Monitors in Annex. The results of the poll is per the following: 20 votes “For”, 19 votes “Against”, and 10 votes “Abstain”. The Chair commented there were more votes “For” than “Against”, therefore Section A.10 will remain in Annex.

6.3.6. The Chair asked for comments on Section A.10.1. It was generally agreed that “Direct Measurement” type hot spot sensors are not used in distribution transformers. It was suggested removing all “Direct Measurement” sections (A.10.1.1 & A.10.1.2) from Annex. The Chair asked the WG if anybody in the WG disagreed with removing these 2 sections. There were no objections.

Therefore, Sections A.10.1.1 and A.10.1.2 "Direct Measurement" were removed from the Annex. The Chair volunteered to revise the numbering and reword the section to reflect the WG comments. This would be submitted for review at the next meeting.

7. New Business

   The Chair asked the WG for any new business that would need to be addressed now as time was growing short. No one brought anything forward.

8. The meeting was adjourned at 3:30 P.M. CST.

[redacted]C57.12.36 – Distribution Substation Transformers – Jerry Murphy

This working group did not meet.

[redacted]C57.12.38 – Single-Phase Pad-Mounted Transformers – Ali Ghafourian

Marty Rave, for Ali Ghafourian, presented the following minutes from the working group meeting on October 19, 2020 at 12:55 p.m. with 78 in attendance.

The Chair called the virtual meeting to order at 12:55 pm CDT.

The Chair called for essential patents and the essential patents presentation slides were shown. No essential patents were brought forward.

The Chair advised the Working Group participants of the IEEE-SA copyright policy and the copyright presentation slides were shown.

9 New Members were introduced with 5 Members being changed to Guest status before this meeting in order to continue to meet quorum.

Quorum was established with 25 out of 40 Working Group members present per poll results generated, but according to preliminary attendance list and attendance list provided at the end of the meeting there were 28 out of 40 Working Group members present. Attendance varied throughout the meeting; therefore attendance was accounted for by using the preliminary attendance list and attendance list provided at the end of the meeting.

The agenda for the meeting was presented. The Chair asked the Working Group members for unanimous approval of the agenda. Hearing no objections from the Working Group members, the agenda was unanimously approved.

The meeting minutes for the 2019 Fall meeting in Columbus, OH were posted on the Distribution Subcommittee website after the meeting for the Working Group members to review. There were no proposed changes to the Fall 2019 meeting minutes brought forth. The Chair then asked the Working Group for unanimous approval of the minutes. Hearing no objections from the Working Group members, the meeting minutes for Fall 2019 meeting were unanimously approved.

The Chair informed the Working Group that the most recent standard was published in August 2014, and the next revision is due in December 2024.

Old Business:

<u>Task Force 1</u>

Jarrod Prince presented a revised informative Annex proposal for accessories developed by the original Task Force of Giuseppe Termini, Wes Suddarth, and Craig DeRouen. New Task Force volunteers Jim Spaulding and Mike Thibault were added at the Fall 2019 meeting. During the Fall 2019 meeting the Working Group reviewed the original proposal to form the informative Annex and suggested the Task Force to delete all the photos of accessories and replace them with sketches/drawings to avoid potential copyright issues. Steve Shull highlighted that the sketches/drawings in the revised informative Annex may still have copyright issues depending on the source material with Ed Smith in agreement on Steve's comment. Jarrod Prince and Craig DeRouen will review the source material for the sketches/drawings of the accessories to determine if there are copyright issues with the present version of the sketches/drawings in revised informative Annex proposal and whether permission is required from a copyright holder. The Work Group agreed that the sketches/drawings should be revised to avoid copyright infringement or should be deleted from the revised informative Annex proposal, if copyright permission is not granted from the copyright holder. This revised informative Annex will be added into the current Draft before for the next revision of C57.12.38 without any sketches/drawings until proper copyright permission is obtained.

Task Force 2

Israel Barrientos presented recommendations for revisions to existing figures in C57.12.38 as the result of a review performed by the Task Force comprised of Jim Spaulding, Mike Thibault, and Israel Barrientos. Israel Barrientos will review C57.12.38-2014 Corrigendum 1-2016 published and update the recommendations for revisions to existing figures in C57.12.38. The updated figures will be added into the current Draft before for the next revision of C57.12.38

Task Force 3

Jeremy Van Horn presented a revision proposal to C57.12.38 developed by the Task Force of Carlos Gaytan, Jarrod Prince, and Jeremy Van Horn due to C57.12.39 standard being published. The revision proposal is incorporated into the current Draft for the next revision of C57.12.38.

New Business:

A new Draft will be posted for Working Group to review before the Spring 2021 meeting that includes the most recent material submitted.

A total of 9 guests requested Working Group membership which will be reviewed to determine who is eligible for membership before the next meeting.

A new Task Force was formed comprised of Jeremy Van Horn, Dan Mulkey, and Bruce Webb with Jeremy as the Task Force lead. This Task Force will review the issue of Touch Temperature of the Tank and make a proposal as to which IEEE C57 standard should contain Touch Temperature information and what type of information should be included.

The Chair announced the Working Group will meet at the Spring 2021 meeting in Toronto, Ontario, Canada.

The Chair adjourned the meeting at approximately 1:45 pm CDT.

[redacted]C57.12.39 – Tank Pressure Coordination – Carlos Gaytan

This working group did not meet

[redacted]Task Force on Transformer Efficiency and Loss Evaluation – Phil Hopkinson

Phil presented the following minutes from the task force meeting on October 19, 2020 at 9:10 a.m. with 80 in attendance. Brian Klaponski asked about a concern with higher touch temperatures of transformers with higher temperature ratings. Phil noted this as a legimate concern. Marty Rave notified the group that there was a task force from C57.12.38 looking into it. Phil asked if UL (Underwriters Laboratory) should be involved. Ali Ghaforian informed the group that the task force of C57.12.38 was meeting on November 2nd.

1. **Call to order and any Chair's remarks**

- 9:10 am meeting was called to order

2. **Quorum Verification**

- Not a working group; Quorum is not necessary

3. **Confirmation of the essential patent statement and responses**

- Not a working group, no patents were discussed.

4. **Approval of minutes of the previous meeting**

- Minutes approved.

5. **Approval of agenda for this meeting.**

- Agenda was posted and followed for this meeting.

6. **Utilities loading data**

   Mr. Mulkey presented on utilities data mostly from Dominion Power (2018) that reflect accumulated smart meter data by transformer (collected over a yr. period) and that the RMS-equivalent loads are ~30 % of nameplate and the peak load <80% of nameplate. We are to anticipate load increase due to electric vehicles and HVAC conversions.

   Dual nameplate KVA transformers were explained as:

   -Base kVA set with 65 C rise parameters

   -Higher kVA based on thermal class of insulation system

   It was noted that we need more data.

7. **Steve Rosenstock report on future utility outlook**

   Phil Hopkinson introduced Steve Rosenstock, Senior Manager, Customer Technical Solutions Edison Electric Institute.

   Mr. Rosenstock report examined quite a number of forecasts for the future that show a 5-50% increase in load, dependent on how electrified the homes and businesses are today. This increase is attributed to 3 key factors: 1) Transportation – plug-in hybrid electric vehicles, 2) Building Electrification, 3) Codes and Standards Policies and Legislation. This will result in significant changes to loading on new distribution transformers over the next 5-10 years.

8. **Kevin Rapp report on insulation thermal class**

   Mr. Rapp reported that considerable work has been going on to develop materials that can operate well at higher temperatures and that natural ester liquid and new thermally upgraded papers have the ability for transformers to be operated at up to 85C rise and still achieve the180,000 hours of life that is recognized for today's 65 C rise transformers,

using mineral oil and thermally upgraded Kraft Paper. It was noted that Formvar magnet wire has shown able to operate at such temperatures as well with natural ester by preventing water from attacking the enamel.

Extensive sealed vessel tests to prove insulation material works. 100 vessels were aged at 5 different temperatures in 2 rounds of different tests. About 3- yrs. of aging to reach end of life points.

9. Tom Prevost report on Thermally upgraded Kraft Paper

Mr. Prevost presented that new thermally upgraded Kraft cellulose paper with Diamond. Pattern Enhanced (DPE) has shown through life tests that it is able to achieve a 75C rise for 180,000 hours in mineral oil and an 85 C rise for 180,000 hours in Natural ester.

Now, by using DPE paper in mineral oil, distribution transformers can:

•Have even further extended life at 65 °C rise (practically double thermal life of TUK)

•or be advanced to 75 °C AWR, or to a dual temperature rating of 65 °C / 75 °C and run hotter without failures (physically smaller or more kVA capacity in same size)

10. Casey Ballard report on thermally upgraded solid materials

Considerable work has been going on in many parts of the world to apply Nomex to either mineral oil or natural ester. In fact, with Nomex, it is permissible to exceed 85 C rise.

11. Al Traut report on dual nameplate designs

Mr. Traut examined a number of key distribution transformer ratings and can see that 85C rise will allow significant increases in kVA with the newly available materials. Clearly these materials will require higher costs than present transformers, but the result of their use will allow increased output power from smaller sizes and comply with the DOE electrical efficiencies.

Al keyed in on the following design and application considerations for Dual kVA Transformers:

Transformer Design Considerations
- Material selection to meet desired thermal class
- Thermal design differences for different liquids
- Coil ducting practice (size, quantity and location) to support higher loads
- Component selection for higher continuous loads (leads, bushings, switches, etc.)
- Switching and load interrupting at higher loads and liquid temperatures.
- Under oil fuse and LV breaker operation. Is de-rating required for higher oil temperatures?
- Gaskets and seals for different liquids and temperatures
- Gas space volume, liquid level and tank pressure coordination
- Maximum conductor temperatures under long duration short circuit

Transformer Application Considerations
- Conductor sizing for transformer installation
- External fuse selection
- Maximum voltage drop at peak loads
- External transformer touch temperature (pad-mounts)

12. Documents

All documents from this meeting will be posted on the IEEE Distribution Transformers Subcommittee website

13. Next meeting--date and location

No additional comments before adjournment at 10:35am EDT.

[redacted]PC57.167 – Guide for Monitoring Distribution Transformers – Gary Hoffman

Gary presented the following minutes from the working group meeting on October 20, 2020 at 3:45 p.m. with 86 in attendance.

1. Call to order and any Chair's remarks – Called to Order at approximately 3:55 PM by Gary Hoffman
2. Quorum Verification – 36 out of 69 WG Members in attendance. 16 Guests requested membership.
3. The Chair presented the Patent slides. No one spoke up with knowledge of any standard essential patents (SEPs) currently included in the draft and no questions about the Patent Policy. The Chair did remind the WG if they become aware of any SEPs, they should notify the Chair and the Chair will request that the SEP holder submit a Letter of Assurance with the IEEE SA. Next the copyright slides were explained with no questions asked.
4. Approval of agenda for this meeting. Motion by Brian Kaplonski, Second by Jerry Murphy − Unanimously Approved
5. Approval of the 14 May 2020 virtual WG meeting minutes. Motion by Trent Williams and, Second by Jon Karas – Unanimously Approved
6. The Chair provided an update from the unofficial WG meeting held 26 June. The issues brought up will be covered in agenda item 9.1.
7. Task Force Reports:
    a. Clause 4 TF: Claude Beauchemin presented for Dan Mulkey to explain the rational for the update that created a new table that succinctly brings together the necessary information that allows a reader to better understand the justification for monitoring the variety of Distribution Transformers. The presentation was well received and the Chair thanked Claude for his presentation.
    b. Clause 5 TF: Jerry Murphy presented. There is still progress to be made to rationalize the table of Monitoring Parameters and to tie in the revised classifications in the Justification for Monitoring. The TF Chair called for volunteers specifically from the user interest category. The Chair thanked Jerry and requested the TF to continue to meet to move Clause 5 into high gear.
    c. Clause 6 TF: Steve Shull for Mike Thibault presented. There was some discussion with the differentiation of the Physical Layer and Data Link Layer. The Chair thanked him for stepping in for Mike and encouraged Mike to convene a TF meeting to complete work on this Clause.
    d. Clause 8 TF: The TF Chair Fenton was unable to present and we look forward to the Clause 8 TF report at our next WG meeting.
8. New business

a. Report on a survey conducted as a result of a discussion at our unofficial 26 June 2020 meeting to include monitoring of tap changing equipment in PC57.167 of the DT and STNP Subcommittees to determine if the concept had traction among Members of both subcommittees presented by Steve Shull. The poll indicated that 73% of the respondents were against including the monitoring of tap changing equipment and 27% were for inclusion. There was no motion made and there was no objection by the party who made the presentation at our 26 June meeting for not including the monitoring of tap changing equipment to PC57.167.

b. The Chair discussed having a mid-January PC57.167 WG meeting. There was no objection and the Chair indicated that a Doodle poll will be sent to the WG participants for a mid-January timeframe.

9. Meeting was adjourned at 5:01 PM CT

C57.12.35 – Bar Coding for Transformers and Regulators– Rhett Chrysler

Rhett presented the following minutes from the working group meeting on October 20, 2020 at 12:55 p.m. with 23 in attendance.

1. Chair called the meeting to order at 12:55pm CDT.
2. Total attendance of 23. 13 of 23 members present and quorum was met. 1 guest requested membership.
3. Chair called for identification of essential patents pertaining to the work of this TF. None brought forward to the TF. IEEE SA Copyright policy presented. No issues identified.
4. Motion to approve meeting agenda by Ken Hampton, 2nd by Steve Shull, Approved unanimously.
5. Motion to approve Fall 2019 (Columbus, OH) meeting minutes by Israel Barrientos, 2nd by Lee Matthews, Approved unanimously
6. Chair Report
    a. Chair asked for a user volunteer to fill Vice Chair role formerly held by Giuseppe Termini.
7. Old Business
    a. TF on QR Codes (Israel Barrientos, Mike Thibault, Dan Mulkey). Israel presented work of the TF to introduce the WG to QR code basics. Next step the TF will look to incorporate the data in C57.12.37 (electronic test data) into a QR code for the WG to evaluate. Added Ramadan Issack and Ken Hampton to TF membership.
    b. TF on Editorial Review (Darren Brown, Al Traut, Ed Smith). Rhett presented 6 of the 7 recommendations of the TF for review and modification.
        i. Comment 1 – Update normative references to replace outdated versions.
        ii. Comment 2 – Replace bar-code with bar code throughout the document.
        iii. Comment 3 – Fix the hyperlink reference to the IEEE SA download site for the list of manufacturers and codes.

iv. Comment 4 – 4.2.6.1 remove the reference to IEEE C57.12.00 since 12.00 does not define life of the nameplate.

v. Comment 5 – 4.2.6.3 and 4.3.5.3 add UVB-313EL lamps to UV testing requirements. Retain the FS-40 bulb method.

vi. Comment 6 – 4.2.6.4 allow the use of camera based scanners to verify readability on 300 series stainless steel permanent labels (nameplates).

vii. A motion was made (Shull/Murphy) to accept these 6 recommendations after discussion. Motion carried unanimously. These changes were incorporated into D2 during the meeting. Comment 7 regarding location of the temporary label in figure 7 for 1ph submersible transformers was tabled to the next meeting.

8. New Business
    a. Item 1 by Gilbert Kozer to add a new manufacturer code was tabled to the next meeting as we ran out of time.
    b. No other new business brought forward.
9. Next meeting April 2021 Toronto, ON Canada
10. Meeting adjourned at 2:10pm CDT.

C.3 Old Business

- No old business was discussed

C.4 New Business

- Jerry Murphy brought forth a discussion on this SC sponsoring a project to develop an IEEE standard covering a capacity regulated transformer.
    - Jerry Murphy made the motion to approve the sponsorship of the project
    - Dan Saur 2nd the motion.
    - Dan noted that IEEE would likely sponsor this project elsewhere if this SC would not sponsor it.
    - Craig Colopy noted that other groups were working on voltage regulating distribution tranformers.
    - Dan noted that this was not a voltage regulating device but instead a capacity regulating device.
    - Brian Klaponski asked if this device was for energy savings.
        - Jerry Murphy answered that per his understanding yes.
    - Jerry Murphy explained the functionality of the device in question.

- Gary Hoffman asked for an amendment to the motion in that the word Power be removed from the purpose of this motion.
    - Jerry and Dan approved the amendment
- Bruce Forsyth clarified that the motion was to have the SC sponsor this project.
- MOTION 1 to approve the amendment as proposed by Gary.
    - 35 Yay – Motion passes
- MOTION 2 to have SC sponsor this project as proposed by Jerry and 2nd by Dan.
    - 26 Yay – Motion passes

- We were over on time and the meeting ended immediately after the voting was complete.

C.5 Chairman's Closing Remarks and Announcements

Ed had no closing comments to the SC.

C.6 Adjournment

Ed adjourned the meeting as provided in the meeting agenda at 10:15am.

List of Attendees and Affiliations:

First Name	Last Name	Company
Jerry	Allen	Metglas, Inc.
Javier	Arteaga	ABB Enterprise Software Inc
Hugo	Avila	Hitachi ABB Power Grids
Donald	Ayers	Ayers Transformer Consulting
Gilles	Bargone	FISO Technologies Inc.
Israel	Barrientos	Prolec GE
Jean-Noel	Berube	Rugged Monitoring Inc.
Kevin	Biggie	Weidmann Electrical Technology
Darren	Brown	Howard Industries
Thomas	Callsen	Weldy-Lamont Associates
Stuart	Chambers	Powertech Labs Inc.
Solomon	Chiang	The Gund Company
John	Chisholm	IFD Corporation
Rhett	Chrysler	ERMCO
Craig	Colopy	EATON Corporation
John	Crouse	Roswell Alliance
Michael	Dahlke	Central Moloney, Inc.
Thomas	Dauzat	General Electric
Hakim	Dulac	Qualitrol Company LLC
Samragni	Dutta Roy	Siemens Energy
Megan	Eckroth	EATON Corporation
William	Elliott	General Electric
Reto	Fausch	RF Solutions
Bruce	Forsyth	Bruce Forsyth and Associates LLC
George	Frimpong	Hitachi ABB Power Grids
Lorne	Gara	Shermco
Benjamin	Garcia	Southern California Edison
James	Gardner	SPX Transformer Solutions, Inc.
Carlos	Gaytan	Prolec GE
Ali	Ghafourian	H-J Enterprises, Inc.
Saurahb	Ghosh	Transformers & Rectifiers (India) Ltd
Orlando	Giraldo	H-J Family of Companies
Zoran	Goncin	PTI Transformers
Monty	Goulkhah	Kinectrics
James	Graham	Weidmann Electrical Technology
Detlev	Gross	Power Diagnostix
Said	Hachichi	Hydro-Quebec
Kendrick	Hamilton	Power Partners, Inc.
Didier	Hamoir	Transformer Protector Corp
Kenneth	Hampton	Baltimore Gas & Electric
Kenneth	Harden	Schneider Electric
Kyle	Heiden	EATON Corporation
Sergio	Hernandez Cano	Hammond Power Solutions
John	Herron	Raytech USA
Gary	Hoffman	Advanced Power Technologies

James	Holt	Memphis Light, Gas & Water
Philip	Hopkinson	HVOLT Inc.
Ramadan	Issack	American Electric Power
Paul	Jarman	University of Manchester
John	John	Virginia Transformer Corp.
Jon	Karas	SDMyers, LLC.
Gael	Kennedy	GR Kennedy & Associates LLC
Gary	King	Howard Industries
Brad	Kittrell	Consolidated Edison Co. of NY
Brian	Klaponski	Carte International Inc.
Andrew	Larison	Hitachi ABB Power Grids
Moonhee	Lee	Hammond Power Solutions
Aleksandr	Levin	Weidmann Electrical Technology
Weijun	Li	Braintree Electric Light Dept.
Xose	Lopez-Fernandez	Universidade de Vigo
Tim-Felix	Mai	Siemens Energy
Jinesh	Malde	M&I Materials Inc.
Richard	Marek	Retired
Joaquin	Martinez	Siemens Energy
Lee	Matthews	Howard Industries
Trevor	Mattson	OMICRON Electronics Corp USA
Philip	Miller	Memphis Light, Gas & Water
Rhea	Montpool	Schneider Electric
Charles	Morgan	Eversource Energy
Jerry	Murphy	Reedy Creek Energy Services
Hossein	Nabi-Bidhendi	ABB Inc.
Aniruddha	Narawane	Power Distribution, Inc. (PDI)
Frank	Neder	Trench Germany GmbH
Kristopher	Neild	Megger
Ashmita	Niroula	Ergon, Inc.
Stephen	Oakes	WEG Transformers USA Inc.
Dwight	Parkinson	EATON Corporation
Vinay	Patel	Consolidated Edison Co. of NY
Caroline	Peterson	Xcel Energy
Chris	Pitts	Howard Industries
Nicholas	Podany	Bureau of Reclamation
Chris	Powell	Intermountain Electronics
Jarrod	Prince	ERMCO
Ion	Radu	Hitachi ABB Power Grids
Kevin	Rapp	Cargill, Inc.
Martin	Rave	ComEd
Robert	Reepe	Georgia Power Co.
Leopoldo	Rodriguez	Transformer Testing Services LLC
Fernando	Saldivar	Prolec GE
Mahesh	Sampat	EMS Consulting Inc.
Albert	Sanchez	Knoxville Utilities Board
Daniel	Sauer	EATON Corporation
Anil	Sawant	Virginia Transformer Corp.

Stefan	Schindler	Maschinenfabrik Reinhausen
Nick	Sewell	Alabama Power
Samuel	Sharpless	Rimkus Consulting Group
Hemchandra	Shertukde	University of Hartford
Kunal	Shukla	PECO Energy Company
Stephen	Shull	BBC Electrical Services, Inc.
Audrey	Siebert-Timmer	IFD Corporation
Adrian	Silgardo	IFD Corporation
Jonathan	Sinclair	PPL Electric Utilities
Edward	Smith	H-J Family of Companies
Adam	Smith	Commonwealth Associates, Inc.
Steven	Snyder	Hitachi ABB Power Grids
Markus	Stank	Maschinenfabrik Reinhausen
David	Stankes	3M
Kerwin	Stretch	Siemens Energy
Janusz	Szczechowski	Maschinenfabrik Reinhausen
Radoslaw	Szewczyk	Specialty Products Poland Sp. z o.o.
Marc	Taylor	Cogent Power Inc.
Dervis	Tekin	Meramec Instrument Transformer Co.
Vijay	Tendulkar	Power Distribution, Inc. (PDI)
Eric	Theisen	Metglas, Inc.
Timothy	Tillery	Howard Industries
Mark	Tostrud	Dynamic Ratings, Inc.
Daniel	Tournoux	SPX Transformer Solutions, Inc.
Alan	Traut	Howard Industries
Parag	Upadhyay	ABB Inc.
Jeremy	Van Horn	IFD Corporation
John	Vartanian	National Grid
Joshua	Verdell	ERMCO
Duy	Vo	Central Maine Power (AVANGRID)
Pragnesh	Vyas	Sunbelt-Solomon Solutions
Sukhdev	Walia	New Energy Power Co.
Shelby	Walters	Howard Industries
Alan	Washburn	Burns & McDonnell
Bruce	Webb	Knoxville Utilities Board
Zachery	Weiss	WEG Transformers USA Inc.
Dr. Alexander	Winter	HIGHVOLT Pruftechnik Dresden
Baitun	Yang	R.E. Uptegraff
Malia	Zaman	IEEE
Kyle	Zemanovic	EATON Corporation