Annex D Dry Type Transformers Subcommittee

Wednesday, March 30, 2022

IEEE Transformer DTSC Spring 2022 Meeting Denver, CO

Chair: **Casey Ballard**

Vice-Chair: **David Walker**

Secretary: **Dave Stankes**

D.1 Introductions, Chairs Remarks and Approval of Agenda and Minutes

The Dry-type Transformers Subcommittee (DTS) met in the Hyatt Regency Denver, CO on March 30, 2022, at 1:30 PM (MDT).

At start of meeting Chair notified the attendees that the meeting would be recorded for the purpose of accurately documenting the minutes, and that recording would be erased once minutes were completed.

Introductions:

No individual introductions were made, but Chair remined participants to announce one's name and affiliation prior to speaking.

Chairs remarks:

Currently there is nowhere to enter attendance as AMS has been deactivated and the system that will replace it is not yet running. WG and TF chairs must retain attendance records so that they may be entered into the new system when it comes online. As attendance should be included as part of the minutes from WG and TF meetings, this would be an acceptable way to retain attendance records.

WG and TF minutes from Spring meeting are requested to be turned into Dave Stankes (Secretary) by April 15th so our subcommittee minutes can be submitted on time. DTS was last subcommittee to turn in minutes from Fall 2021 meeting and we do not want to repeat this.

Chair announced that there will be new required training for all the officers (TF, WG, Subcommittee, Main Committee). People already in a leadership role must complete training before the end of the year. Chair believes that people that are assuming leadership role for first time may need to complete the training prior to starting their new role. Exact timing on completing the training is still being determined. It is expected that it will take on average 6 to 8 hours to complete the training. Chair that if anyone had concerns regarding the training, they should voice these with Malia Zaman. Tom Prevost asked what the ramifications were of not completing the training, and Chair answered that he did not know. Chair cited that the training tool would be especially useful for new leaders, providing them with a roadmap of what to do. Reminded attendees that regardless of the number of years' experience in leadership roles, everyone will need to complete the training.

IEEE is creating a place to put documents that we use to create standards, IEEE SA Contributor Collection. Contributions may be different types of documents ranging from pure research to technical analysis, complete technical specifications and use cases. An example of something that could be stored is a tool that we may use to help create a graph. If the Contribution is used in the standard, we could then reference web location (storage area) of the content.

In addition to the patent right and copyright slides that are required to be shown prior to starting a meeting, new slides on expected behavior, code of conduct, and guidance on voting will need to be shown. The guidance on voting reinforces the need for people to vote based on their own beliefs and not on that of their company or other influences and reinforces that IEEE activities shall allow fair and equitable consideration of all viewpoints.

Chair reviewed the need to review copyright information prior to meetings and believes the DTS is doing a good job of adhering to this requirement. If it is an IEEE Transformer Committee document, we can share it.

Chair encouraged TF/WG leaders to utilize virtual meetings held between the Spring/Fall meetings to help accelerate progress on documents. Highlighted the successful use of virtual meeting by Joe Tedesco who used these to rapidly complete work on C57.12.52. Reminded leaders to notify the Chair if a virtual meeting is scheduled so he can share with the SC in case there were other individuals who would like to attend. Also send information regarding the meeting to Sue McNelly so it can be posted on the IEEE Transformer Committee website. Meeting minutes must be prepared these should be part of the minutes from the next in person meeting.

Reminded WG Chairs to maintain up to date membership lists. Members who have missed 2 of the last 3 meetings should be contacted to see if they intend to attend the next meeting. Remove all who have communicated they will no longer be participating. If member status of a person is changed, you must contact the person and explain why his/her status is being changed.

The meeting was convened with 28 people in attendance 17 of the 32 members of the DTS were present, so quorum was reached. Chair noted that the slide showing members shared during the meeting must be updated, including removing two people that have notified us they will no longer participate (John John and Juan Pablo Medina) and adding missing member (Maish Saraf).

Approval of agenda and meeting minutes:

Chair entertained a motion to approve the planned agenda that was displayed at the meeting. Motion to Approve – Tim-Felix Mai, 2nd – Rhea Montpool. Agenda was approved unanimously.

Chair entertained a motion to approve the Fall 2021 DTS meeting minutes that were posted on the Transformer Committee website. Motion to Approve - Aniruddha Narawane, 2nd – Klaus Pointner. The minutes from the Fall 2021 DTS meeting were approved unanimously.

Due to the possibility of some members of the DTS having to leave early from this meeting, the Chair asked WG or TF Chairs if there were any motions that needed to come before the DTS for a vote. Two WG Chairs noted that they had motions in need of DTS approval (Colby Lovins WG Chair of C57.134 and Art Del Rio WG Chair of C57.16). These were moved up in the order of the agenda as to not lose quorum due to the possibility of any DTS members leaving early.

D.2 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.2.1 Revision of IEEE PC57.134 Chair Colby Lovins

Chair: Colby Lovins
Acting Secretary: Joseph Tedesco

This was the third meeting of the IEEE C57.134 Working Group. The meeting was held in the Mineral Hall A Meeting Room and Colby Lovins called the meeting to order at 3:16 PM.

There were 18 people present in the meeting. There were 10 members and 8 guests. 3 guests requested membership. The Working Group had 17 members; therefore, a quorum was reached, and business could proceed.

Colby presented the agenda and asked for a motion to approve it. Casey Ballard made a motion to accept the agenda and it was seconded by Tim-Felix Mai. Approval was unanimous, and the agenda was approved.

Colby then asked for a motion to approve the minutes of the last two Working Group meetings. Tim-Felix Mai made the motion and Casey Ballard seconded it. There was unanimous approval, and both sets of minutes were approved.

The patent slides were shown, and the copyright policy was discussed. There were no essential patent claims.

Old Business:

- Colby reviewed the task forces.
- Colby continued reviewing the draft, starting with Section 4.

New Business:

- Colby discussed potential changes to Section 5.2, including additional details about encapsulation, ambient temperatures, stabilizing materials, and conductors.
    - Tim-Felix Mai made a motion to accept the changes, and Ken Klein seconded the motion. There was no discussion.
        - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- Colby reviewed the proposal for the location of temperature sensors in Section 5.3.2, discussing changes in wording and details about how the location to position the temperature sensors may be determined.
    - Ken Klein made a motion to accept the changes, and Dave Stankes seconded the motion. There was no discussion.
        - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- There was a discussion about the wording about the value of the exponent n. It would refer to C57.12.91 for values. Manish Saraf asked about the inclusion of sealed/nonventilated transformers, and Casey Ballard suggested that the wording be updated to avoid implying that there were only two types of transformers (ventilated self-cooled and ventilated forced air-cooled).
    - Casey Ballard made a motion to accept the revised wording, and Ken Klein seconded the motion. There was no further discussion.
        - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- Colby discussed conversations he had with Chuck Johnson and Paulette Powell-Payne about the Annex. They had suggested reorganizing sections and changing some wording.
    - Ken Klein made a motion to accept the changes, and Dave Stankes seconded the motion.
        - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- Roger Wicks suggested looking at Section 2 to determine if the Normative References could be updated. C57.12.01 and C57.12.80 were added (they had been in the Bibliography).

- Colby had originally planned to leave the Bibliography to later, but Tim-Felix suggested removing older references from the Bibliography. There was discussion about whether older references should be left in.
- Casey Ballard made a motion to send the draft to the subcommittee for a vote to go to SA ballot, and Sasha Levin seconded the motion. There was discussion about whether doing that skipped Tim-Felix and Dave's potential work on updating the Bibliography. Casey held that if there were problems with the Bibliography, they would be indicated during balloting. Dave preferred to review the references and update them, if necessary, with a vote for the draft to go to the subcommittee to be handled virtually.
    - Vote: 6 for, 1 against, 3 abstentions.
        - 7 of the 10 members present voted (70%), exceeding the requirement that 67% of the quorum vote.
        - 6 of the 7 votes were affirmative (86%), exceeding the requirement that 51% of the votes be affirmative.
            - Having met both the requirements for the draft to be sent to subcommittee, the motion PASSED.
- Casey Ballard made a second motion to establish a Comment Resolution Group (CRG) with an odd number of members that was empowered to make changes to the draft without seeking approval of the Working Group. Ken Klein seconded the motion. There was no discussion.
    - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- Colby asked for volunteers for the CRG.
    - Colby Lovins, Joe Tedesco, Ken Klein, Casey Ballard, and Tim-Felix Mai volunteered.

Colby informed the Working Group that, prior to the Spring 2022 meeting, Juan Pablo Medina had stepped back from his IEEE responsibilities. Colby asked if there were any volunteers, and there were none. He asked if there would be objection to Joe being appointed as the new Secretary, and there was unanimous consent.

The date of the next meeting was not announced.

The meeting was adjourned at 4:12 PM.

At the DTS a **motion** was made by Colby Lovins that the current draft of C57.134 be submitted for the SA Ballot process. The motion was seconded by Ken Klein.
Discussion: Tom Prevost asked if the working group had a 2/3 majority. Colby answered yes (86% approval to send document to ballot.)
Chair asked if anyone objected to unanimous approval of the motion. No one objected.
Chair asked if anyone abstained from voting. No one abstained.
Motion was approved.

Chair thanked Colby for moving the document so quickly to ballot.

ATTENDANCE

Role	First Name	Last Name	Affiliation
Member	Robert	Ballard	DuPont
Guest	Tim	Holdway	Dogwood Marketing
Guest	Jeremy	Johnson	Intermountain Electronics
Member	Ken	Klein	Johnson Electric
Member	Aleksandr	Levin	Weidmann Electrical Technology
Chair	Colby	Lovins	Federal Pacific
Guest	Kushal	Mahajan	Eaton
Member	Tim-Felix	Mai	Siemens Energy
Guest	Aniruddha	Narawane	EATON Corporation
Guest	Vinay	Patel	Consolidated Edison Co. of NY
Member	Chris	Powell	Intermountain Electronics
Guest	Afshin	Rezaei-Zare	York University
Member	Manish	Saraf	Hammond Power Solutions
Guest	Brian	Sonnenberg	Instrument Transformers, LLC
Member	David	Stankes	3M
Member	Joseph	Tedesco	Hitachi Energy
Guest	Muhammad	Wazir	Eaton
Member	Roger	Wicks	DuPont

D.2.2 Revision of IEEE C57.16 Chair Art Del Rio

PC57.16 Standard for Requirements, Terminology, and Test Code for Dry-Type Air-Core Series-Connected Reactors

Denver, CO, USA

Hyatt Regency Denver Hotel

Monday, March 28, 2022

The working group for the revision of C57.16 met in the Centennial H room of the Hyatt Regency Denver Hotel on Monday March 28, 2022, at 9:30 AM.

1. Introductions and Call for Patents

- 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 and copyright issues. None was reported.
- The attendance rosters were circulated.

2. Verification of Quorum

- There was a total of 18 participants: 5 Members and 13 Guests out of which two guests requested membership.
- 5 of the current 11 WG Members were present and no quorum to carry out business was met.

3. Approval of the meeting agenda of the December 14, 2021, supplemental virtual meeting

- The meeting agenda, which was circulated by email among members and guests on March 24, 2022 by email, was presented to the participants.
- The agenda will be circulated among the WG members for voting. The alternatives will be Approve, Disapprove or Abstain to approve the agenda.

4. Approval of the minutes of the December 14, 2021, supplemental virtual meeting

- The minutes from the supplemental meeting, which were circulated on March 24, 2022 by email, will be circulated among the WG members for voting. The alternatives will be Approve, Disapprove or Abstain to approve the minutes.

5. Review the draft document distributed among members; next step.

- The draft standard, IEEE C57.16/D5, which was circulated on March 24 was discussed.
- All changes from the beginning of the revision work are marked in colors.
  - Yellow parts are the changes
  - Grey are parts that should be discussed
  - Red are parts that are proposed to be deleted
- Discussion of the grey parts:
  - Clause 7.2.5. The text regarding the relation of three-phase short-circuit currents and single line-to-ground fault currents, for three-phase reactors, should be verified. The WG Chair, Art Del Rio, will check with Dave Caverly and Pierre Riffon who has been mostly involved in this.
  - Clause 9.1, note “a” under Table 6. The background to this note, regarding reduced insulation levels across reactors by a parallel surge arrester, is not clear. It makes sense because sometimes it will be a more optimal solution with a smaller reactor if it is protected by a parallel surge arrester. This text is maybe coming from Pierre Riffon. The WG Chair, Art Del Rio, will check with him.
  - Clause C.4.3, NOTE 15 regarding slightly modified discharge frequency if a damping resistor is included. The changed frequency is probably due to the stray inductance of the resistor. The WG Chair, Art Del Rio, will check with Pierre Riffon.
- Discussion of the red parts:
  - The red parts are four standards in the bibliography which are not referred to in the standard. They should be removed.
- Discussion of other parts:
  - The latest draft of the standard is considered to be in good shape, mostly thanks to Dave Caverly who has done most of the job.
  - Annex A (Specific requirements for dry-type air-core filter reactors) is considered to be in good shape. Klaus Pointner volunteered to anyway go through it thoroughly to ensure that it fits together.
  - Klaus Pointner mentioned that Annex G (Converter reactor applications) does not have a bibliography. It was concluded that a bibliography is not needed for Annex G since it does not refer to any other standards. Testing of AC side converter reactors is quite straight forward according to the test in the main parts of C57.16.

6. Discussion

- We need to get approval by Cigré for material that we have copied from their documents.

- Our PAR expires December 31 this year. We might get an extension with one extra year if we apply for that in October. Anyway, we must do our best to finalize the work as soon as possible.
- We should try to get approval from the Dry Type SC as soon as possible to get approval to start the ballot process. The SC requires a simple majority to pass.
- Prior to a possible SC approval, we must get a 2/3 approval by the WG members to ask the SC for approval to start the ballot process. Since we don't have quorum, we will try to get the WG approval via email.
- The ballot process will in short be:
  - The WG Chair will invite any interested parties to join the ballot pool. The invitation period is normally 30 days.
  - The ballot normally runs for 30 days.
  - A Ballot Resolution Group should then review and answer the comments minimize the negative votes in a recirculation ballot.
  - Normally a recirculation ballot is needed. The minimum time is 10 days.
  - Submit to RevCom

5. New Business

- There was no new business.

6. Adjournment

- The meeting was adjourned at 10:20 AM.

Next meeting: Fall 2022 – Charlotte (Sheraton/Le Meridien), North Carolina USA, October 16 – 20, 2022

Attendance S22 list and membership status.

Role	First Name	Last Name	Company
Guest	Gilles	Bargone	FIS0
Chair	Art	Del Rio	Siemens Energy
Guest	Jonathan	Deverick	Dominion Energy
Guest	Thomas	Falkenburger	Coil Innovation USA, Inc.
Guest	Jeffrey	Gragert	Xcel Energy
Guest	Kendrick	Hamilton	Power Partners, Inc.
Guest	Derek	Hollrah	Burns & McDonnell
Guest	Kurt	Kaineder	Siemens Energy
Guest	Ken	Klein	Grand Power Systems
Guest	Kushal	Mahajan	Eaton
Member	William	Munn	Southern Company Services
Guest	Aniruddha	Narawane	Eaton
Member	Klaus	Pointner	Trench Austria GmbH
Secretary	Ulf	Radbrandt	Hitachi Energy
Guest	Manish	Saraf	Hammond Power Solutions, Inc
Member	Michael	Sharp	Trench Limited
Guest	Muhammad	Wazir	Eaton
Guest	Malia	Zaman	IEEE

Note: Since there was no quorum during the meeting, an e-mail vote among WG Members was carried out prior to the Wednesday March 30th, 2022, Dry-Type Subcommittee meeting.

Original Message (C/W attachments)

Subject: RE: Members only / WG on revision of C57.16 Dry Type air core reactors. S22 Denver, CO / Motion to SA Ballot by WG
Sent: Mon, 3/28/2022 3:47 PM
From: Del Rio, Javier Arturo (javier.del_rio@siemens-energy.com)

Dear Member of WG C57.16,

We had the scheduled meeting this morning, unfortunately we were not able to reach quorum. We have decided to take a vote via e-mail on the approval of the agenda, previous meeting minutes and our intent to move the latest draft of IEEE C57.16 to SA ballot.

Please reply with your vote before the SC meeting, March 30th, 11 am MT (Denver time) of

APPROVE (you approve the agenda and minutes and support moving to SA ballot)

DON'T APPROVE (you don't approve the agenda and minutes you do not support moving to SA ballot)

ABSTAIN

As a reminder, the PAR extension for this WG expires the end of December 2022.

With kind regards
Art Del Rio

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The compilation of the responses for the approvals:

Approve	Minutes	Agenda	Ballot
David Caverly	1	1	1
J. Arturo Del Rio	1	1	1
Alexander Gaun	1	1	1
William Munn	1	1	1
Caroline Peterson	No response	No response	No response
Sylvain Plante	1	1	1
Klaus Pointner	1	1	1
Ulf Radbrandt	1	1	1
Pierre Riffon	1	1	1
Devki Sharma	1	1	1
Michael Sharp	1	1	1

Casey Ballard (SC Chair)	1	1	1
Total Approvals	11	11	11
Total Approval rate [%]	91%	91%	91%

Respectfully submitted,
Chairman: Art Del Rio (a.delrio@ieee.org)
Secretary: Ulf Radbrandt (ulf.radbrandt@ieee.org)

At the DTS a **motion** was made by Art Del Rio that the current draft of C57.16 be submitted for the SA Ballot process. The motion was seconded by Mike Sharp.
Discussion: None
Chair asked if anyone objected to unanimous approval of the motion. No one objected.
Chair asked if anyone abstained from voting. No one abstained.
Motion was approved.

Chair asked Art if the WG has formed a comment resolution group. Art answered that one has not yet been formed as they did not have a quorum at this meeting.

Chair thanked Art for moving this important document forward. Art in turn thanked Klaus Pointner, Mike Sharp and David Caverly for their contribution.

Virtual Meeting
Monday, December 14, 2021

The working group for the revision of C57.16 met virtually in Teams on Tuesday December 14, 2021, at 9:00 AM, Eastern Time.

1. Participants

Art Del Rio	Siemens Energy	Chair
David Caverly	Trench Limited	Vice Chair
Ulf Radbrandt	Hitachi ABB Power Grids	Secretary
Caroline Peterson	Xcel Energy	Member
Sylvain Plante	Hydro-Quebec	Member
Klaus Pointner	Trench Austria GmbH	Member
Michael Sharp	Trench Limited	Member
Jonathan Deverick	Dominion Energy	Guest
Saurabh Ghosh	General Electric	Guest
Kurt Kaineder	Siemens Energy	Guest
Ken Klein	Grand Power Systems	Guest
Hemchandra Shertukde	University of Hartford	Guest
Brad Staley	Salt River Project	Guest
Helena Wilhelm	Vegoor Tecnologia Aplicada	Guest
Malia Zaman	IEEE SA	Guest

2. Introductions and Call for Patents

- The meeting was called to order at 9:00 AM by the WG Chair Art Del Rio.

3. Verification of Quorum

- There was a total of 14 participants: 7 Members and 7 Guests
- 7 of the current 11 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 December 8, 2021, by email, was presented to the participants. There were no objections or comments, and the agenda was approved unanimously.
- The minutes of the F21 November 15th, 2021, Virtual meeting, which was circulated by email among members and guests on December 8, 2021, by email, was unanimously approved

4. Discuss and review, Dave Caverly

- Dave Caverly gave a presentation regarding the latest activities regarding
  - Annex B - Dry-type air-core shunt capacitor reactors.
    - B.3.1 General
      The text regarding shunt capacitor reactor is subject to inrush current transients has been updated since the Fall 2021 meeting. It is now clearer regarding the reduction of BIL and effect on short circuit current if a surge arrester is located in parallel with the reactor.
  - Annex B1 – Informative. Supplementary to Annex B
    - B1.5.0 Typical arrangements
      The explanation for Figure 3c with neutral side TLI, is corrected.
    - B1.7.5 Risk Assessment
      The text is updated to explain that the main effect of applying a MOV across the reactor is to reduce the BIL of the reactor but it might also reduce the short circuit current of the reactor.
  - Annex F System considerations, TRV
    - This Annex is unchanged since last meeting.

5. Coming work for this WG

- Malia Zaman to give brief summary for next step for us. .
  - Basically, when WG approves the drafts, the SC should approve it too before initiation of a SA ballot.
  - The WG should decide how to proceed.
  - Will the whole WG be the Comment Resolution Group (CRG) or should a smaller group be created?
- Mike Sharp asked if we have talked about Cigré agreement? We do have permission to use material from Cigré if we just use what specified. We shouldn't use whole document.
- We should have one more meeting in and of January and then ask SC for approval to go to Ballot at end of March.
- Deadline is 17 of January all feedback ready. Draft to be circulated before February 1.
- Caroline Peterson and Ulf Radbrandt can help to support as consultant in Word.

6. Adjournment

- The meeting was adjourned at 10:02 AM.

Respectfully submitted,
Chairman: Art Del Rio (a.delrio@ieee.org)
Secretary: Ulf Radbrandt (ulf.radbrandt@ieee.org)

D.2.3 Revision of C57.12.59 Chair Derek Foster (not present) (Casey Ballard offered comments on Derek's behalf)

Derek Foster TF Chair, David Walker Vice Chair, and Tim-Felix Mai Secretary were tasked with reviewing the document and submitting recommendation for Title, Scope, and Purpose for a proposed PAR for the revision of C57.12.59. The team recommended that Title (IEEE Std C57.12.59 IEEE Guide for Dry-Type Transformer Through-Fault Current Duration) and Purpose would remain unchanged from current document. TF also submitted proposed recommendations for changes to the Scope (proposed changes in green) and these were shown to the DTS.

1.2 Purpose

This guide sets forth recommendations believed essential for the application of overcurrent protective devices that limit the exposure time of dry-type transformers to short-circuit currents. This guide is not intended to imply overload capability.

Current

1.1 Scope

This guide for dry-type transformer through-fault current duration applies to dry-type distribution and power transformers built in accordance with C57.12.01

Proposed

1.1 Scope

This guide for dry-type transformer through-fault current duration applies to dry-type distribution and power transformers built in accordance with C57.12.01 and referenced as Categories I, II and III.

The TF had previously approved a motion to submit the PAR to the DTS for approval and grant permission to submit their PAR for approval.
Chair asked if anyone would like to make a motion on the TF's behalf that the DTS approve the PAR and allow it to move forward with submission.
Tim-Felix Mai made a **motion** that the DTS approve the PAR and allow it to move forward with submission. Aniruddha Narawane seconded the motion.
Discussion: None
Chair asked if anyone objected to unanimous approval of the motion. No one objected.
Motion was approved.

Chair asked that Tim-Felix Mai as an officer of the TF share the good news with Derek and David that the motion was carried and request that they go ahead with the PAR submittal.

D.2.4 Revision of IEEE C57.12.52 Chair Joseph Tedesco

Minutes – IEEE C57.12.52 – WG – Sealed Dry- Type Transformers.

Meeting held in Mineral Hall B-C, at the Hyatt Regency Denver at the Convention Center

Meeting started at 11:00 am by Chair Joseph Tedesco

The Secretary, David Walker, was unable to attend. Roger Wicks volunteered to be acting Secretary for the meeting.
Joe reviewed the agenda, introduction of the attendees was conducted. A Quorum was reached (with 7 of the 13 members present), so the minutes from last fall's meeting and the agenda were approved. (Casey Ballard made the motion and Colby Lovins seconded the motion.) There were 7 members and 18 guests in attendance. Due to the work being completed, the working group was not accepting new members.
Joe reviewed the guidelines and patent policy and there were no issues raised by the attendees.
Joe the spent the rest of the meeting reviewing the status of the document.

- Due to prior meetings, a PAR revision was agreed to and submitted to Revcom and it was approved.
- An email ballot was conducted of the working group members regarding readiness to go to ballot, and this was approved unanimously by the working group (10 members with 3 abstentions).
- The subcommittee was then polled and they too agreed that the document was ready to go to ballot (the procedures were followed by the working group). 20/33 members voted with unanimous approval.
- Joe then solicited a single volunteer (Aniruddha Narawane) to add to six initial members of the CRG to make sure there is an odd number.
- Joe then finished the discussion by outlining the final steps of the document (SA Ballot, comment resolution (if needed) and recirculation (if needed).

The meeting adjourned at 11:12 am.

Chair asked if anyone had heard that if you conduct an email ballot you must have 2/3 response rate instead of 50% for in person ballot? (He had heard this mentioned at other meetings during the week, but was not aware of this in any IEEE manual.) No one had heard of this requirement. Chair suggested to be sure that the approval to go to ballot was valid, that Joe submits another motion to the DTS requesting that the draft in current form as approved by the working group be submitted for SA ballot. (Chair will check on the requirement for electronic motion and if different than for what is required for in person voting he will send an email out to members and guests of the DTS informing them of the new rules.)

Joe Tedesco made a **motion** to the DTS requesting that the draft in current form as approved by the working group be submitted for SA ballot.
Motion was seconded by Kerwin Stretch.
Discussion: None
Chair asked if anyone objected to unanimous approval of the motion. No one objected.
Motion was approved.

ATTENDANCE

Role	First Name	Last Name	Affiliation
Member	Robert	Ballard	DuPont
Guest	Solomon	Chiang	The Gund Company
Member	Sergio	Hernandez Cano	Hammond Power Solutions
Guest	Tim	Holdway	Dogwood Marketing
Guest	Phil	Hopkinson	HVOLT Inc.
Guest	Jeremy	Johnson	Intermountain Electronics
Guest	Ken	Klein	Johnson Electric
Guest	Aleksandr	Levin	Weidmann Electrical Technology
Member	Colby	Lovins	Federal Pacific
Guest	Kushal	Mahajan	Eaton
Member	Tim-Felix	Mai	Siemens Energy
Guest	Ken	McKinney	UL
Guest	Aniruddha	Narawane	EATON Corporation
Guest	Vinay	Patel	Consolidated Edison Co. of NY
Member	Chris	Powell	Intermountain Electronics
Guest	Chad	Powell	Hitachi Energy
Guest	Manish	Saraf	Hammond Power Solutions
Guest	Dan	Sauer	Eaton
Guest	Pulal	Selvaraj	VA Transformer
Guest	Brian	Sonnenberg	Instrument Transformers, LLC
Member	David	Stankes	3M
Guest	Kerwin	Stretch	Siemens Energy
Chair	Joseph	Tedesco	Hitachi Energy
Guest	Muhammad	Wazir	Eaton
Guest	Roger	Wicks	DuPont

D.2.5 Revision for IEEE Revision of C57.12.01 Chair Casey Ballard

The meeting was called to order at 1:45 pm MDT by Chair Casey Ballard.

Chair made opening comments and leaders of the WG were introduced.

This is the First meeting of the WG for the next round of IEEE C57.12.01 continuous revision.

Chair noted that, as this is the first WG meeting, the membership can be requested.

Attendance was collected and the meeting was convened with 27 participants, 22 participants have requested and were granted membership in the WG comprising a quorum for this meeting.
The list of attendees is presented at the end of this report.

The Meeting Agenda was reviewed.
Motion: "approve the agenda", moved by A. Narawane, seconded by K. Stretch, approved unanimously.
The Unapproved Minutes of the Fall 2021 meeting was reviewed.
Motion: "approve the Fall 2021 Meeting Minutes", moved by T-F. Mai, seconded by A. Narawane, approved unanimously.

Chairman requested patent disclosure, no patent claims were made.
IEEE Guidelines on WG procedure and IEEE Copyright policy have been reviewed and understood.
The chair used the attached presentation to guide the meeting:

IEEE C57-12-01 Spring 22.pptx

Old Business

Status of PAR at NesCom: PAR has been approved and WG is formed.

New Business

- Review/modify list of the potential new topics to be addressed in the standard revision.

Chair propose that smaller TF are formed addressing different topics that WG decides to work on.

- Average Ambient Temperature harmonization with IEC.

- T-F. Mai proposed a motion on the temperature limit: "Add 20 °C as maximum yearly average temperature of cooling air in the next revision of the standard". K. Klein seconded the motion. Discussion: such decision will contradict to other IEEE standard, do we want to establish this only for dry-type transformers? There is a difference between IEEE and IEC in this regard, but all IEEE documents would have be revised in this regard. Vote: 1 in favor, 14 are opposed; motion failed.
- T-F. Mai proposed a new motion: "Add maximum yearly average cooling temperature". This motion wasn't seconded.

- Transportation and storage conditions

- T-F. Mai proposed a motion: "Add that, if there are transport size or weight limits, they should be specified by the purchaser. Add transport acceleration, for example, the transformer shall withstand an acceleration of 1 G in all directions". K. Stretch seconded. Discussion: 1 G is a very low, insignificant acceleration. Is only unusual conditions shall be specified? Vote: 3 in favor, 11 opposed, 5 abstain; motion failed.
- T-F. Mai proposed a motion: "Add a low temperature limit for transportation and storage". Seconded by R. Montpool. Discussion: the lower temperature limit is important for cast coil only. We don't want to separate requirements by technology. Vote: 17 in favor, 3 abstained; **motion passed**.

- Climatic classes

- T-F. Mai proposed a motion: "Standardize storage and operational temperatures". This motion wasn't seconded.

- Environmental Conditions

- T-F. Mai proposed a motion: "Do we want to define environmental conditions?" Seconded by D. Stankes. Discussion: some of these requirements are in IEEE C57.94. Vote: unanimously in favor, **motion passed.**

Chair ask all participants to indicate their interest in the following topics:

- Environmental Requirements
  - Thermal Shock

  No interest.
  - Salt Fog

  Will be in the environmental conditions consideration (see above).
  - Fire Performance

7 participants were interested.

- Solid cast pole mounted transformers.

6 participants were interested.

- eV charging infrastructure (harmonics, loading)

No interest.

- On-load tap changers.

4 participants were interested.

- Thermal calculations for short circuit – any updates from IEC?

This has already been addressed in the current standard.

- 100 kV class equipment

No interest.

- Impulse levels pending Dielectric Test SC report.

Shall be clarified.

- Differentiation of Power vs Distribution transformers (like liquid filled).

No interest.

- Remove the short circuit current limitation of 25 times and define a new limit.

11 participants were interested.

- Include 50Hz requirements wherever 60Hz currently appears in the document.

1 participant was interested.

- QC impulse test

6 participants were interested.

- Negative impulse and associated test levels

7 participants were interested.

- Alternative energy generation

No interest.

S. Shull noted activities on HF transformers (solid-state transformers) to be considered at some future point.

- Pass/Fail criteria for insulation resistance

13 participants were interested.

- Pass/Fail criteria for power factor

12 participants were interested.

Chair requested members and participants to select one or several topics and develop a proposal on what we would like to accomplish.

With no further business, the meeting was adjourned at 3:00 pm MDT.

Chair: Casey Ballard
Secretary: Sasha Levin

Aniruddha Narwane had a comment during the DTS meeting about the possibility of looking at Insulation Resistance values for dry-type transformers, coordinating with the TF for the revision of C57.12.91.

Meeting Participants List

1 Robert Ballard	DuPont	Chair
2 Aleksandr Levin	Weidmann Electrical Technology	Secretary
3 Aniruddha Narawane	Power Distribution, Inc.	Member
4 Kerwin Stretch	Siemens Energy	Member
5 Solomon Chiang	The Gund Company	Member
6 Tim-Felix Mai	Siemens Energy	Member
7 Rhea Montpool	Schneider Electric	Member
8 Ken Klein	Grand Power Systems	Member
9 Joseph Tedesco	Hitachi ABB Power Grids	Member
10 Colby Lovins	Federal Pacific Transformer	Member
11 Brian Sonnenberg	Instrument Transformers, LLC	Member
12 Manish Saraf	Hammond Power Solutions	Member
13 Dave Stankes	3M	Member
14 Weijun Li	Braintree Electric Light Department	Member
15 Manajan Kushal	Eaton	Member
16 Eduardo Gomez Hennig	Siemens Energy	Member
17 Ken McKinney	UL	Member
18 Bob Fyrer	DuPont	Member
19 Jonathan Deverick	Dominion Energy	Guest
20 Muhammad Wazir	Eaton	Member
21 Giovanni Hernandez	Virginia Transformer Corp.	Member
22 Jeremy Johnson	Intermountain Electronics	Guest
23 Chris Powell	Intermountain Electronics	Member
24 Vinay Patel	ConEd	Guest
25 Tim Holdway	Dogwood MKT	Guest
26 Ryan Hogg	Bureau of Reclamation	Member
27 Thomas Falken-Burger	Coil Innovation	Guest

D.2.6 Revision for IEEE 259 **Chair Dave Stankes**

Chair: David Stankes
Vice-Chair/Secretary: Joseph Tedesco

This was the fourth meeting of the IEEE 259 Working Group. The meeting was held in the Mineral Hall B-C Meeting Room and Dave Stankes called the meeting to order at 4:47 PM.

This was the first in-person meeting in over two years, and quick introductions were made by everyone in attendance. Dave advertised the open position of Secretary. There were no immediate volunteers..

There were 22 people present in the meeting. There were 9 members and 13 guests. No one requested membership. The Working Group had 17 members; therefore, a quorum was reached, and business could proceed.

Dave discussed the revised agenda and asked for a motion to approve it. Colby Lovins moved to accept the revised agenda, with Tim-Felix Mai seconding the motion. There was no discussion, and approval was unanimous. The revised agenda was approved.

Dave then asked for a motion to approve the minutes of the last meeting, which had been held virtually in early March 2022. Aniruddha Narawane so moved, with a second from Roger Wicks. There was no discussion, and approval was unanimous. The minutes from the last meeting were approved.

Dave had sent out the patent and copyright slides prior to the meeting. He asked if there were any patent or copyright concerns from those in attendance; no one had any concerns or noted any patent/copyright issues.

Old Business:

- Dave Stankes briefly discussed the history of the standard and the status of the revised draft. He pointed out that Ed Van Vooren had made an initial attempt at creating a first draft, reorganizing and revising it. Dave began reviewing this draft, as a starting point for discussions.
- The first point of contention was that the scope in the revised draft didn't match the scope in the PAR. That scope covered up to 600 V, while the revised draft included voltages above 600 V. It was noted that, while it was possible to revise the scope to include higher voltages, doing so would put IEEE 259 into conflict with the scope of C57.12.60, which starts at 601 V. Such a conflict would likely lead to the PAR revision being rejected.
- Dan Sauer and Casey Ballard asked if the solution would be to reopen C57.12.60 and take out all references to voltage. There was a question about the consequences of doing this, which was directed at Roger Wicks (former chair of C57.12.60). Roger pointed out that IEEE 259 was mentioned in conjunction with LV, so if you removed all mention of voltages, what would you do for LV?
- Sasha Levin asked if the same materials could be used in LV and HV coils? Manish Saraf also asked if dielectric and mechanical stresses could be considered in the aging? There was a discussion around both points, that the same materials could be used and also that thermal degradation was the chief means of aging, particularly in LV transformer, where other stresses are generally low.
- There was a discussion regarding the voltage ranges covered by other standards bodies, namely UL, NEMA, and NEC. All consider LV to cover up to 1000 V.
- The question of changing the scope of C57.12.60 down to 0 V was considered, and what the consequences would be. The point was made that doing so would invalidate all LV

insulation systems approved using UL 1446. Colby Lovins pointed out that users would likely keep using their established systems, even if they had been approved with UL 1446, because they would have the history of operation in the field.

- There was a discussion regarding what standards are reference. UL 1562 (MV transformers) explicitly references C57.12.60, while UL 1561 (general purpose transformers) explicitly references UL 1446. Similarly, Colby Lovins read off the recently balloted draft of NEMA ST-20, which also references UL 1446.
- It was noted that IEC 61857-21 is essentially the sister document to UL 1446, and any IEEE standards could be updated to refer to IEC 61857-21.
- Dave noted that there were major questions still outstanding.
    - How to handle the difference between 40,000 hours in C57.12.60 and the 20,000 hours in IEEE 259?
        - This is essentially a distinction between MV and LV.
    - How to handle RTI vs. TI? Should IEEE 259 remain a RTI test method?
        - IEEE 259 is a RTI test, requiring a reference. C57.12.60 is a TI test, which is independent of any references.
    - How to handle the overlap in voltages between the standards?
    - Could the additional work done in the revision be moved to an appendix, so that it would not be lost?
- Dave reminded everyone that there were individual Task Forces working on the various sections of the draft, and ultimately, the proposals for what to do with the sections would come from them. After stating this, he resumed reviewing the draft.
- The question was asked that if IEEE 259 became a TI, how different was it from C57.12.60? There was some discussion around this question.
- There was also an issue raised that current LV test methods lead to materials being qualified for voltage ranges where those materials would not actually pass tests in a real transformer. It was further pointed out that this was likely not a concern for established manufacturers, but for newcomers to the market.

New Business:

- Dave Stankes stated that his plan was for the individual Task Forces to meet over the next few months and to reach a conclusion on a plan for the draft before the meeting in Charlotte this Fall.

The date of the next meeting for the whole Working Group will be either October 17 or October 18, 2022. That meeting will be in Charlotte, NC.

The meeting was adjourned at 6:03 PM.

ATTENDANCE

Role	First Name	Last Name	Affiliation
Member	Robert	Ballard	DuPont
Member	Solomon	Chiang	The Gund Company
Guest	Sergio	Hernandez Cano	Hammond Power Solutions
Guest	Tim	Holdway	Dogwood Marketing
Guest	Jeremy	Johnson	Intermountain Electronics
Guest	Ken	Klein	Johnson Electric
Guest	John	Kotula	Dominion Energy
Member	Aleksandr	Levin	Weidmann Electrical Technology
Guest	Chau	Li	Eaton
Member	Colby	Lovins	Federal Pacific
Guest	Kushal	Mahajan	Eaton
Member	Tim-Felix	Mai	Siemens Energy
Guest	Ken	McKinney	UL
Guest	Rhea	Montpool	Schneider Electric
Guest	Chris	Powell	Intermountain Electronics
Member	Manish	Saraf	Hammond Power Solutions
Guest	Dan	Sauer	Eaton
Guest	Brian	Sonnenberg	Instrument Transformers, LLC
Chair	David	Stankes	3M
Secretary	Joseph	Tedesco	Hitachi Energy
Guest	Muhammad	Wazir	Eaton
Member	Roger	Wicks	DuPont

D.2.7 Revision of IEEE C57.94 Vice Chair Dave Stankes

The Working Group met in Centennial F Meeting room. The meeting was called to order at 8:03 AM by Vice-Chair David Stankes.

Vice-Chair made opening comments.

Introductions were made by all participants. WG Roster has been distributed and signed.

Attendance:
- 19 total participants
- 14 Members
- 5 guests

As this was the first meeting of the WG, a quorum was established.

WG Meeting Agenda
1. Welcome & chair's remarks
2. Introduction of attendees
3. Approval of agenda
4. Approval of TF minutes from Fall 2021 virtual meeting
5. Call for essential Patents & IEEE SA Copyright Policy review
6. PAR status
7. Review of IEEE C57.94 sections and future assignments
8. Meeting Adjournment

The agenda was approved unanimously without discussion. Motion: Colby Second: Ken

The TF Meeting minutes of the virtual Fall 2021 Meeting were approved unanimously without discussion. Motion: Roger Second: Joe

The vice-chair presented the information on Patent Disclosures and asked the group to report any relevant patent issues – None were communicated.

New Business:

- **PAR Status**
  PAR was approved in Feb 2022. Last revision was in 2015 and is in really good shape.
- **New Chair**
  The Chair has stepped down and Ken Klein agreed to take over the position as chair and he will lead the next meeting.
- **TF for review**
  Vice chair is asking for volunteers to review the different sections:
  - Normative references: Roger
  - Definitions: Tim-Felix
  - Application: Colby & Chris
  - Installation: Dave
  - Testing: Kerwin & Joe
  - Operation: Casey
  - Maintenance: Ken Klein & Kerwin

The vice chair will shar the comments from the last revision with the TF

With no further business, the meeting was adjourned, without objection, at 8:33 PM.

The WG will meet again at the Fall 2022 meeting in Charlotte (Sheraton / Le Meridien), NC USA, October 16 – 20, 2022.

Vice-Chair: David Stankes

Secretary: Tim-Felix Mai

Participation list:

First Name	Last Name	Company	
David	Stankes	3M	Vice Chair
Robert	Ballard	DuPont	Member
Tim-Felix	Mai	Siemens Energy	Secretary
Ken	Klein	Grand Power Systems	Member
Joseph	Tedesco	Hitachi Energy	Member
Colby	Lovins	Federal Pacific	Member
Chris	Powell	Intermountain Electronics	Member
Ken	McKinney	UL	Member
Jeremy	Johnson	Intermountain Electronics	Member
Tim	Holdway	Dogwood marketing	Guest
Michael	Sharp	Trench LTP	Guest
Solomon	Chiang	TGC	Member
Zaman	Malia	IEEE SA	Guest
Eduardo	Gomez	Siemens Energy	Member
Roger	Wicks	DuPont	Member

Kerwin	Stretch	Siemens Energy	Member
Klaus	Pointer	Trench Austria	Guest
Manish	Saraf	Hamond Power	Member
Sergio	Hernandez	Hamond Power	Member

D.2.8 Revision of IEEE C57.96 Chair Aniruddha Narawane

- Meeting called to order at 11:00 am by the Chair
- The chair presented the information on Patent Disclosures and asked the group to report any relevant patent issues – None were communicated.
- The chair presented the information on the IEEE Copyright – No question, comments, or concerns were raised.
- The current membership list was shown and a poll to establish a quorum was taken. A quorum was achieved with 8 of 16 members present.
    - A small number of attendees stated that they had requested membership in the previous meeting but were not shown in the membership roster. The Secretary will investigate this discrepancy and correct any errors.
    - It was noted that a few members have communicated that they will no longer be able to participate.
- The chair shared the WG Meeting Agenda. The agenda was approved unanimously without discussion.
- The chair shared the Meeting Minutes from the Fall 2021. The minutes were approved unanimously without discussion.
- Draft D2 was shared on screen with the membership.
- C57.12.80 was added to Section 2 Normative Reference. It was noted that additional references may need updating in this section as well. Chair requested all interested parties to submit additional references to add or update by e-mail.
- General consensus of the membership was that we will not copy text or data across standards, we will refer to them only.
- Section 4 – Overview was reviewed. Small discussions about whether to remove or keep the reference to C57.12.56-1986. Decision to keep due to the existing history created by use of this standard.
- Lengthy discussion in Section 5 – Loading Equations primarily around inconsistency of the exponents used in the hot spot temperature equations of C57.96 (variable M) versus C57.12.9 (variable N)
- A motion was made by Colby Lovins, seconded by Casey Ballard to add the following language to section 5.1, with the intent of applying it consistently throughout the document –

    > "N is the exponential value that may be different for different types of transformers. Refer to IEEE C57.12.91 for the appropriate value"

    The motion was passed unanimously.

- Lengthy discussion regarding the application of the correction factor took place with the decision to table the topic, collect ideas from the members, and revisit in a future meeting.

- It was decided that it may be useful to add an official calculation tool that could be referenced in the standard and shared via an IEEE portal. Secretary will discuss this suggestion with Chuck Johnson who had already volunteered to work on the calculation program.
- Table 4 "Altitude Corrections" was highlighted as being critically important to end users. It was decided that some example calculations of how to apply this table could be included in an Annex. It was further suggested that Annex B of C57.12.01 could serve as a guidance for preparing this,
- Meeting adjourned on time at 12;15
- Next meeting: Fall 2022 – Charlotte, NC USA

WG C57.96 - MEETING ATTENDANCE

Third WG Meeting – Spring 20222
Tuesday, March 29, 2022

First Name	Last Name	Company	Role
Robert	Ballard	DuPont	Member
Samson	Debass	EPRI	Member
Giovanni	Hernandez	Virginia Transformer Corp.	Member
Sergio	Hernandez	Hammond Power Solutions	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
Timothy	Holdway	Retired	Guest
Jeremy	Johnson	Intermountain Electronics	Guest
Ken	Klein	Grand Power Systems	Member
Colby	Lovins	Federal Pacific	Member
Kushal	Mahajan	EATON Corporation	Guest
Tim-Felix	Mai	Siemens Energy	Member
Aniruddha	Narawane	EATON Corporation	Chair
Chris	Powell	Intermountain Electronics	Member
Manish	Saraf	Hammond Power Solutions	Member
Mike	Sharp	Trench Limited	Guest
Mike	Spurlock	Sperlock Engineering Services	Guest
Kerwin	Stretch	Siemens Energy	Secretary
Joseph	Tedesco	Hitachi Energy	Member

Muhammad Areeb	Wazir	EATON Corporation	Guest
Roger	Wicks	DuPont	Member

Chairman: Aniruddha Narawane
Vice-Chairman: Iman Mohamed
Secretary: Kerwin Stretch

D.2.9 Revision of IEEE C57.124 Chair Tom Prevost

Co-Chairman: Tom Prevost
Co-Chairman: Rick Marek (absent)
Secretary: Hemchandra Shertukde (absent)

Casey Ballard volunteered to take minutes of the meeting.

Call to order by Chair Tom Prevost 3:15pm

Members present 11 out of 21

Removed Mark Gromlovits, Jagdish Burde, Detlev Gross, and added Sergio Hernandez and Manish Saraf to membership list

Approval of the agenda motion Tim-Felix Mai and second Alex Kraedge. Approved unanimously

Approval of the minutes fall 2021 motion Tim-Felix Mai and second by Emilio Moralez-Cruz and approved unanimously

Patent slides were shown and no comments

No comments on the copyright slides

Chair covered the title scope and purpose for clarity and noted C57.113 was also open.

The introduction should be updated to reference 10pC for solid cast and 50pC for resin encapsulated and referenced to C57.12.01

Less than 5pC for sensitivity would be appropriate based on the background noise (its an installation challenge and not a metering challenge)

Do we want to include the term 'PD free' and if so what does it mean?

WG does not want to include the future R&D projects and investigations related to Paschen's Law nor the specific values for coupling capacitors

WG does not want to define the PD test during applied voltage testing

Sergio Hernandez volunteered to draw the dry-type connection diagrams using a coupling capacitor instead of the liquid filled bushing and he will share with the Chair who will then share it with the WG. They were originally developed for C57.113.

The Chair will update the introduction after the body is ready.

Meeting adjourned at 4:25pm
Next meeting: Fall 2022 – Charlotte, NC USA

Attendance

Name	Company	Member/Guest
Joseph Tedesco	Hitachi Energy	M
Alexander Kraetge	Omicron	M
Manish Saraf	Hammond Power Solutions	M
Sergio Hernandez Cano	Hammond Power Solutions	M
Solomon Chiang	TGC	M
Roger Wicks	Dupont	M
Dominique Bolliger	HV Technologies Inc.	M
Emilio Morales-Cruz	Qualitrol	M
Tim-Felix Mai	Siemens Energy	M
Janusz Szczechowski	MR / Germany	M
Casey Ballard	Dupont	M
Colby Lovins	Federal Pacific	G
Brian Sonnenberg	Instrument Transformers	G
Evan Knapp	Eaton Corp.	G
Michael Shannon	REA Magnet Wire	G
Ken Klein	Johnson Electric Coil	G
Jaroslaw Chorzepa	ABB Inc.	G
Kerwin Stretch	Siemens Energy	G
Tim Holdway	Dogwood MKT	G
Chris Powell	Intermountain Electronics	G
Jeremy Johnson	Intermountain Electronics	G
Brad Kittnell	Con Edison NY	G
Rahul Yadav	Dupont	G

D.2.10 Revision of IEEE C57.12.91 Vice Chair Tim-Felix Mai

1. The Working Group met at the Hyatt Regency Denver, CO – Centennial H Conference Room. The meeting was called to order at 4:45 PM by Vice Chair Tim-Felix Mai. Chair, David Walker, was unable to attend.
2. Vice Chair made opening comments.
3. First working group meeting. 22 in attendance. 15 Requested membership
4. Introductions

Approval of Agenda: The Spring 2022 agenda was approved unanimously without discussion.
Motion: Alex Winter
Second: Sergio Hernandez Cano

Approval of Minutes: The Fall 2021 minutes were approved unanimously without discussion.
Motion: Casey Ballard
Second: Kerwin Stretch

Call For Patents: The Vice Chair presented the information on Patent Disclosures and asked the group to report any relevant patent issues – None were communicated.

Copyright Notice: The Vice chair presented the IEEE_SA Copyright Policy. No discussion.

Old Business

- **Status of PAR at NesCOM**
  - Par was approved prior to Spring meeting
- **Topics for Consideration in new revision (show of hands to see who is interested in working on each topic)**
  - **Temperature rise test**
    - Update exponents used in eqns. 25, 26, 27 and 42 (based on Hammond data) (8)
    - Define "free from drafts" (2)
  - **Load Loss for Metering phase angle correction like C57.12.90 (2)**
  - **Add Scott-T figure to 9.3.4.3 (0)**
  - **Impulse Test**
    - Change to match C57.12.90 (rFCCFFF waves, min-nominal-max taps) (4)
    - Change/Add to negative polarity to match IEC dry and IEEE liquid. This must be aligned with C57.12.01 and test levels must be adjusted. (11)
    - Define QC with reduced and Full like C57.12.90 section 10.4.2.1 Method 1 (10)
  - **Short Circuit Test**
    Match with C57.12.90 (0)
  - **Distribution and Power same / different (0)**
  - **Environmental**
    Fire (4)/ climatic (2) / environmental (6)
  - **AFWF Testing WF? WF/XX? (4)**
  - **AF testing should be done with fans on or turn the fans off? (10)**
  - **Insulation Resistance is a Routine Test for >300 kVA. Should Pass/Fail Criteria be developed (discussion and agreement that the pass/fail criteria should be in 12.01)**
  - **Temperature Rise test cooling curve timing. It is currently open to interpretation. (7)**
  - **Test for Solid Cast Pole Mounted Transformers (4)**
  - **Tests for On load tap changers (6)**
  - **Include 50 Hz testing where there are 60 Hz tests-depends on direction of C57.12.01 (11)**
  - **Can load losses be at tested at a lower than rated current? Can a tolerance be added? (10)**

New Business:

- **Safety Aspects for testing – Tim-Felix Mai discussed an issue with customer requiring a faster resistance measurement during temperature rise testing than required in the standard. The standard says "as fast as possible" Tim is not requesting a change, but to make the Working Group aware of the safety issue and to encourage manufacturers to be safe and not rush the resistance measurements.**
- **Discussion of Partial Discharge patterns-should they be included in the standard? It was decided that the patterns should be added to the Guide. If it is added to the Guide, then a reference could be added to the C57.12.91 Standard.**

Adjournment: With no further business, the meeting was adjourned, without objection, at 5:21 PM.

The Working Group will meet again at the Fall 2022 meeting,

Chair: David Walker (not present at meeting)
Vice Chair: Tim-Felix Mai
Secretary: Rhea Montpool

At the DTS meeting Roger Wicks asked the DTS whether any of the transformer manufactures have been receiving requests regarding information on higher frequency dielectric performance as he has been receiving questions regarding material performance at higher frequencies. None of the members or guests said they have heard of such a request.

Participation list:

Last Name	First Name	Company	Requesting Membership
Ballard	Robert	DuPont	Yes
Chiang	Solomon	The Gund Company	No
Frye	Rich	Eaton	No
Fyrer	Bob	Dupont	No
Hernandez	Giovanni	Virginia Transformer Corp.	Yes
Hernandez Cano	Sergio	Hammond Power Solutions	Yes
Herron	John	RayTech USAS	Yes
Holdway	Tim	Dogwood Mkt	No
Johnson	Jeremy	Intermountain Electronics	No
Klein	Ken	Johnson Elec	Yes
Lovins	Colby	Federal Pacific	Yes
Mai	Tim-Felix	Siemens Energy	Yes
Montpool	Rhea	Schneider Electric	Yes
Pepe	Harry	Phenix Technologies, Inc.	No
Powell	Chris	Intermountain Electronics	Yes
Saraf	Manish	Hammond Power Solutions	Yes
Sonnenberg	Brian	Instrument Transformers, LLC	Yes
Stankes	David	3M	No
Stretch	Kerwin	Siemens Energy	Yes
Tedesco	Joseph	Hitachi Energy	Yes
Wicks	Roger	DuPont	Yes
Winter	Dr. Alexander	HIGHVOLT Pruftechnik Dresden	Yes

D.2.11 IEEE C57.12.80 Liaison Report Tim-Felix Mai

Reported there is no new information related to dry-type transformer in the revision of C57.12.80.

D.3 Old Business

D3.1 Standards report

Chair reported that we are in good shape regarding status of our documents, as all of the documents that are going to expire will do so far enough out that we do not need to start working on them yet.

Chair presented the standards report which will be published on the Transformer Committee website. Recommended that we get through balloting process for many of the documents that were voted on at the DTS today before picking up any new documents to work on.

D.4 New Business

Tim-Felix informed the DTS of new activity in IEEE P3105 Recommended Practice for Design and Integration of Solid-State Transformers in Electric Grid. Tim told the DTS that the first meeting was held only a few weeks ago if there was interest from any of our members of participating in the development of this document.

Joe Tedesco asked if we should consider working on the revision of IEEE C57.12.55 as the workload in the DTS decreases and we have more band width. Chair said that the decision to work on the document would be made by the membership by submitting a motion to this effect. Joe said at this time he was not prepared to make a motion but only wanted to make sure it stayed on the radar screen of the DTS as it is our primary enclosure standard. Chair reminded DTS that there was an earlier discussion on whether this was a document that could be worked on in conjunction with IEC or even CSA.

Dave Stankes suggested that it may be useful for TF and WG chairs to submit to the DTS Chair concise highlights that could be easily summarized during Committee Meeting DTS reviews held on Thursday.

With no further business, the meeting was adjourned at 2:40PM.

Chairman: Casey Ballard

Vice Chairman: David Walker

Secretary: David Stankes (prepared meeting minutes)

Attendees

First Name	Last Name	Affiliation	Member/Guest
Robert	Ballard	DuPont	Member
Solomon	Chiang	The Gund Company	Member
J. Arturo	Del Rio	Siemens Energy	Member
Sergio	Hernandez Cano	Hammond Power Solutions	Member
Holdway	Tim	Retired	Guest
Ken	Klein	Johnson Electric Coil	Member
Aleksandr	Levin	Weidmann Electrical Technology	Member
Colby	Lovins	Federal Pacific	Member
Tim-Felix	Mai	Siemens Energy	Member
Rhea	Montpool	Schneider Electric	Member
Nam Tram	Nguyen	ABB Inc.	Guest
Klaus	Pointner	Trench Austria GmbH	Member
Chris	Powell	Intermountain Electronics	Guest
Tom	Prevost	Weidmann Electrical Technology	Member
Manish	Saraf	Hammond Power Solutions	Member
Ulf	Radbrandt	Hitachi Energy	Guest
David	Stankes	3M	Member
Kerwin	Stretch	Siemens Energy	Member
Joseph	Tedesco	Hitachi Energy	Member

Michael	Sharp	Trench Limited	Member
Roger	Wicks	DuPont	Member
Brian	Sonnenberg	Instrument Transformers, LLC	Guest
Rich	Frye	Eaton	Guest
Jeremy	Johnson	Intermountain Electronics	Guest
Kyle	Zemanovic	Eaton	Guest
Angela	Leigl	Eaton	Guest
Jared	Bates	Oncor Electric Delivery	Guest
Ken	McKinney	UL	Guest