**Subcommittee Dry Type Meeting Minutes**

**Wednesday, 13 March 2024, 1:30pm – 2:45 pm PT – Spring 2024 (Vancouver, BC Canada in-person meeting)**

- Chair: Casey Ballard (DuPont)
- Vice-chair: Dave Walker (MGM Transformer)
- Secretary: Dave Stankes (3M) – notes taken by Evanne Wang (DuPont)

The Chair called the meeting to order at 1:30pm PT and welcomed attendees to the meeting. The leadership introduced themselves. A quorum was achieved including the Chair and Vice-Chair. The breakdown of attendees is shown below:

- Attendees present: Fifty-three (53)
- Members present: Twenty-three (23) (quorum minimum is 16 members)
- Guests requesting membership: Two (2)
- Guests granted membership: One member will be granted membership following the 2024 Spring Meeting
- Member moved to guest status: One (1)
- *New total of members: 31 (Following the 2024 Spring Meeting)*

Solomon Chiang (The Gund Company) proposes that the QR code system be used to take attendance at the next meeting.

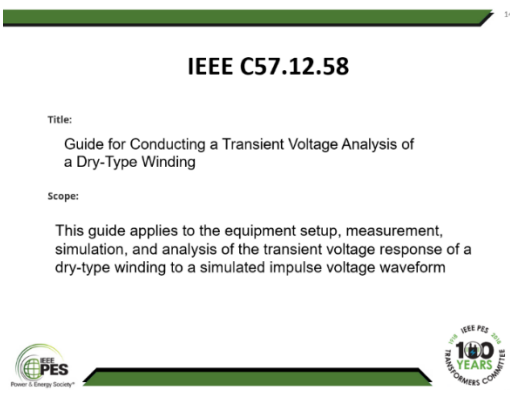
The meeting agenda, Essential Patent Claims information, and copyright information were reviewed. No patent claims were noted.

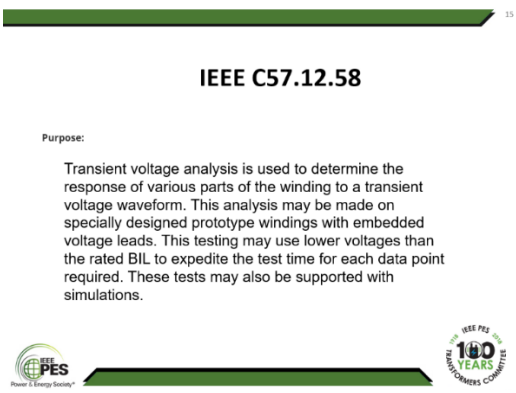
The minutes from the last meeting on October 25th, 2023 were reviewed and unanimously approved. Colby Lovins (Federal Pacific) made the motion and was seconded by Ken Klein (Johnson Coil). The proposed agenda for this meeting was reviewed and unanimously approved. Tim-Felix Mai (Siemens Energy) made the motion and was seconded by Rhea Montpool (Schneider Electric). Both unapproved minutes from the last meeting and the proposed agenda were sent prior to the in-person meeting to the members and guests of this SC.

Summary discussion of the WG and TF:

1) **C57.12.58**

– Ken Klein (Johnson Coil) presents a motion to open a PAR for C12.58 for the title and scope shown on the slide below. This was motioned by Ken Klein (Johnson Coil) and seconded by Vijay Tendulkar (Eaton), and unanimously passes.



The Working Group met in Regency (EF) Meeting room. The meeting was called to order at 11:00 AM by Chair Ken Klein.

Chair and Subcommittee Chair Casey Ballard made opening comments.

TF Roster has been distributed and signed.

Attendance:
- 31 total participants
- 21 Members
- 10 guests

There were 19 out of 19 members present. A quorum was present.

**PAR study group Meeting Agenda**
1. Welcome & chair's remarks
2. Introduction of attendees, attendance
3. Approval of agenda
4. Call for essential Patents & IEEE SA Copyright Policy review
5. Title and Scope
6. Vote to open a Working Group
7. Meeting Adjournment

The chair presented the information on Patent Disclosures and IEEE SA Copyright Policy. He asked the group to report any relevant patent issues – None were communicated.

The Current Title was presented by the chiar

Motion: Use the same title as the current as the current document.
'Guide for Conducting a Transient Voltage Analysis of a Dry Type Transformer Coil'
Motion: Joe, Second: Vijay
Motion was approved unanimously.

The Current Scope was presented by the chiar
Klaus asked if simulations should be included. Casey stated that it can be included even if it later not be addressed in the document.
Scope was adjusted to include simulation.

'This guide applies to the equipment setup, measurement, simulation, and analysis of the transient voltage response of a dry-type transformer coil to simulate impulse voltage waveform.'

Motion Use the scope as displayed.
Motion: Manish, Second: David
Discussion: Casey if the wording should be changed from dry-type transformer coil to dry-type winding
3 in favor 13 against, 2 abstain.
Motion failed.

Scope was adjusted, the wording changed from dry-type transformer coil to dry-type winding.
'This guide applies to the equipment setup, measurement, simulation, and analysis of the transient voltage response of a dry-type winding to a simulate impulse voltage waveform.

Motion Use the scope as displayed.
Motion: Casey, Second: Klaus

Motion was approved unanimously.

Motion: Change the title that it matches the new scope, change from dry-type transformer coil to dry-type winding.
New title: 'Guide for Conducting a Transient Voltage Analysis of a Dry Type winding.'
Motion: Casey, Second: Joe
Motion was approved unanimously.

The Current Purpose was presented by the chiar.
'Transient voltage analysis is used to determine the response of various parts of the coil to a 1.2 μs × 50 μs impulse wave. This analysis can be made on specially designed prototype coils with embedded voltage leads. This testing uses significantly lower voltages than the rated BIL to expedite the test time for each data point required.'

Joe proposes to take out the time in the purpose statement. In the further discussion the group agreed to change the wording from coil to wind to match title and scope. Manish proposed to change the word impulse to transient. Klaus proposed to add wording about simulation to the purpose. Joe proposed to change the wording from can to may: 'Transient voltage analysis is used to determine the response of various parts of the winding to a transient voltage waveform. This analysis may be made on specially designed prototype windings with embedded voltage leads. This testing may use lower voltages than the rated BIL to expedite the test time for each data point required. These tests may also be supported with simulations.'

Motion Use the purpose as displayed.
Motion: Casey, Second: Colby
Motion was approved unanimously.

Motion To take the title. Scope and Purpose to the subcommittee
Motion: Joe, Second: Casey
Motion was approved unanimously.

The meeting was adjourned, without objection, at 12:10 PM.

Chair: Ken Klein

Secretary: Tim-Felix Mai

**Participation list:**

| | First Name | Last Name | Company | |
|---|---|---|---|---|
| 1 | Tom | Melle | HV-ATS | Member |
| 2 | David | Walker | MGM Transformer | Member |
| 3 | Sherif | Salem | Eversou Energy | Guest |
| 4 | Moonhee | Lee | Hammond Power | Member |
| 5 | Edmu | Aralah | BPA | Guest |
| 6 | Caroline | Peterson | Xcel Energy | Member |
| 7 | Mihir | Amin | Eaton | Member |
| 8 | Tendulkar | Vijay | Eaton Corp | Member |
| 9 | Tommy | Nunn | JST Power Equipment | Guest |
| 10 | Shawn | Nunn | Hitachi Energy | Member |
| 11 | Manish | Saraf | Hammond Power | Member |
| 12 | Renjic | Fu | Ermco / V&F | Guest |
| 13 | Camilo | Casallas | Trench | Member |
| 14 | Andre | Moreno | Siemens Energy | Member |

| | | | | |
|---|---|---|---|---|
| 15 | Rafael | Grajeda | Eaton | Guest |
| 16 | Alberto | Sancoral | Eaton | Guest |
| 17 | Luis | Mendez | JST Power Equipment | Guest |
| 18 | Giovanni | Hernandez | Virginia Transformer | Member |
| 19 | Serio | Herandez Cano | Hamond Power Solutions | Member |
| 20 | Val | Tatu | Powersmiths | Member |
| 21 | Erik | Tarango | Olsun Electric | Guest |
| 22 | Colby | Lovin | Federal Pacific | Member |
| 23 | Klaus | Pointer | Trench Austria | Member |
| 24 | Bob | Fyrer | DuPont | Member |
| 25 | Dave | Komm | Hammond Power Solutions | Member |
| 26 | Joseph | Tedesco | Hitachi Energy | Member |
| 27 | Casey | Ballard | Dupont | Member |
| 28 | Tim-Felix | Mai | Siemens Energy | Secretary |
| 29 | Ken | Klein | Jonnson | Chair |
| 30 | Patrycia | Janozs | IEEE SA | Guest |

2) **C57.12.01** – summary given by the Chair - no comments from SC.

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

The chair made opening comments and introduced the leaders of the WG.

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

Attendance was collected and the meeting was convened with 61 participants, 26 members were present out of 34 total WG members; the meeting quorum was established. The membership can be requested and will be granted if the attendance requirements are met.

The list of attendees is presented at the end of this report.

*The Meeting Agenda* was reviewed.

Motion: “Approve the Agenda”, moved by C. Lovins, seconded by T-F. Mai, approved unanimously.

*The Unapproved Minutes* of the Fall 2023 meeting were reviewed (Minutes were posted on the website).

Motion: “Approve the Fall 2023 Meeting Minutes”, moved by R. Montpool, seconded by K. Klein, approved unanimously.

The Chair requested the *Patent Disclosure*, no patent claims were made.

*IEEE Guidelines on WG procedure and IEEE Copyright policy* have been reviewed and understood.

The Chair commented that to be the most efficient all suggestions should be provided in writing and sent to the Chair in advance of the WG meetings.

The Chair used the attached presentation to guide the WG meeting.

IEEE C57-12-01
Spring 24.pptx

**Old Business**

**TF Annex Proposal on Fire Performance (Mai)**

Nothing new to report. The TF will be continued until the Fall 2024 meeting.

**TF on Environmental Conditions Update (Mai)**

Nothing new to report. The TF will be continued until the Fall 2024 meeting.

**Insulation Resistance Pass/Fail Criteria (Tedesco)**

. No proposals at this time. The topic will be removed from future agendas.

**Power Factor Testing Pass/Fail Criteria (Walker)**

IEEE C57.12.91 recommends to measure and monitor of the PF's trend, but there is no Pass/Fail criteria. Concern is with the variability of the test conditions. M. Locarno offered to share the available dry-type's PF statistical data separated in field tests (majority of the data) and factory tests and, also, between open ventilated and cast resin designs. This data will be shared by Locarno with the WG at the Fall 2024 meeting.

**Consequences of Exceeding a Maximum System Voltage (Tedesco)**

*Proposal: Clause 5.10.4 The preferred tapping range is 5% in 2.5% steps above and below rated voltage. Transformers may be provided with taps for voltages above rated voltages without increasing the insulation level, provided that the maximum system voltage defined in Table 3 is not exceeded. If the maximum system voltage is exceeded, the transformer shall be designed to withstand both the low frequency voltage level and the BIL for the next highest voltage class, according to Table 3.*

It was recognized that these are very rare cases. As a transformer is a part of the system, the system limitations are will still apply. The respective recommendations of the IEEE 12.00 and IEC were reviewed.

In case of exceeding max system voltages, the agreement between a manufacturer and an user can be considered. Without any specific request, the proposal was tabled in the Fall 2023 meeting and no effort was made to resurrect it. The topic will be removed from future agendas.

**New Business**

**On-Load Tap-Changers (Mai)**

*Tim-Felix made a motion: include the following modified text from IEEE C57.12.00 in IEEE C57.12.01:*

**"8.~~3~~4 Additional routine tests on transformers with load tap changing ~~or regulating transformers~~**

**8.~~3~~4.1 Ratio tests on load tap changing transformers**

Ratio tests on load tap changing transformers shall be made

~~a) At all connection positions of the tap-changer for de-energized operation with the LTC on the rated voltage position.~~

~~b)~~ At all LTC positions ~~with the tap-changer for de-energized operation on the rated-voltage position.~~

**8.~~3~~4.2 Impedance voltage and load-loss tests on load tap changing transformers**

Impedance voltage and load-loss tests, at maximum, rated and minimum voltage tap position, ~~as listed in Table 18,~~ shall be made on one unit of a given rating when multiple units are produced by one manufacturer at the same time".

V. Tendulkar seconded the motion. In the discussion: IEEE C57.12.91 would have had many changes (following IEEE C12.90 OLTC tests). The concern was about the fact that this technology is, still, rare in dry-type transformers.

Vote: 2 for, 10 against, 9 abstain – motion failed.

**Inclusion of 50 Hz (Tedesko)**

There was no proposal for changes. The topic will be removed from future agendas.

**Short Circuit Temperature Calculation (Hossain)**

Comparison of C57.12.01 and C57.12.00 for liquid-type transformers. Differences in the similar equations described. There were no differences in the previous version of the C57.12.01.

It is shown that the temperature calculation equation shall be accidentally changed in the last revision of the standard and the editorial error is corrected.

As IEC calculation is easier compared to the IEEE one, D. Walker proposed to establish the IEC s.c. temperature calculation as a preferable method with IEEE method being optional. T-F. Mai seconded the motion. Vote: 18 for, 0 against, 3 abstain – motion passed.

V. Tendulkar proposed to consider a different way to calculate the s.c. temperature for the short duration currents (see attached file). Also proposed is an inclusion of the calculation of the asymmetrical fault current and respective temperatures. This will be discussed as a new business.

C57.12.01 – SHORT CIRCUIT CALCULATIO

**Dry-type pole-mounted transformers (Mai)**

Corrections proposed:

- clause 4.1.10 Storage and 4.1.11 Operation: the added descriptions would not be applicable for pole-mounted units (outdoor application). – To be added to the New Business for Fall 2024.

- clause 6.3: correct the text "are directly exposed..." – corrected.
- 6.6.1: only the terminals should be per C57.12.20. The bushings could be designed in accordance with the dialectic requirements. – To be added to the New Business for Fall 2024.

**Potential new business for the next meeting:**

- Insulation coordination and tests

P. Hopkinson raised the question on the insulation coordination of the dry-type and oil-type distribution transformers: as both of these apparatus are subject of the switching over-voltages caused by the operation of the vacuum circuit breakers, the BIL test levels shall be similar in both cases. The current HV tests are not coordinated with the reality of the operation. The current discussions on the mitigation of the switching voltages in IEEE C57.142 considers both high voltage and medium voltage systems.

C. Ballard mentioned that this aspect has been considered in the previous work of this WG's current PAR and the previous motion failed. P. Hopkinson will bring up a new proposal to the attention of the WG.

- R. Hoggs questioned the current Table 13 of the standard: 3-ph class I transformers are limited to 500 kVA, which seems like not correct considering the current application practices. This definition affects the respective s.c. duration. The question will be reviewed as a new business.

The WG will meet again during the Spring 24 IEEE TC meeting.

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

Chair: Casey Ballard

Vice Chair: Joe Tedesco

Secretary: Sasha Levin

**WG IEEE C57.12.01 Meeting Participants List – Spring 2024**

| | Last name | First name | Company Name | Role |
|---|---|---|---|---|
| p | Amin | Mihir | EATON | Guest |
| p | Ballard | Robert | DuPont | Chair |
| p | Chen | Binshan | BC Hydro | Guest |
| p | Chiang | Solomon | The Gund Company | Member |
| p | Debass | Samson | EPRI | Member |
| p | Dulac | Hakim | APT | Guest |
| p | Fernandez | Miguel | Braintree Electric Light Dept. | Guest |
| p | Fong | Sarford | GA Power | Guest |

| | | | | |
|---|---|---|---|---|
| p | Fu | Renjie | ERMCO/VF Transformers | Guest (RM) |
| p | Fyrer | Bob | DuPont | Member |
| p | Gara | Lorne | Telos | Guest (RM) |
| p | Garcia | Miquel | Hitachi Energy | Guest |
| p | Ghosh | Rob | GE | Guest |
| p | Grajeda | Rafael | EATON Corporation | Guest (RM) |
| p | Gross | Detlev | Power Diagnostix Consultant | Guest |
| p | Guang | Yuan | Hitachi Energy | Guest |
| p | Hernandez | Giovanni | Virginia Transformer Corp. | Member |
| p | Hernandez Cano | Sergio | Hammond Power Solutions | Member |
| p | Hogg | Ryan | Bureau of Reclamation | Member |
| p | Hopkinson | Philip | HVOLT Inc. | Guest |
| p | Hossain | Saif | Trench Ltd. | Guest |
| p | John | John | Virginia Transformer Corp. | Member |
| p | Iman | Mohammad | MGM Transformer Company | Member |
| p | Klein | Ken | Johnson | Member |
| p | Komm | Dave | EATON | Guest |
| p | Lee | Monhee | Hammond Power Solutions | Member |
| p | Levin | Aleksandr | Weidmann Electrical Technology | Secretary |
| p | Li | Weijun | Braintree Electric Light Dept. | Member |
| p | Lovins | Colby | Federal Pacific | Member |
| p | Macias | Alejandro | Centerpoint Energy | Guest |
| p | Mai | Tim-Felix | Siemens Energy | Member |
| p | Mani | Kumar | Duke Energy | Guest (RM) |
| p | Martinez | Daniel | JFE Shoji Power, Canada | Guest |
| p | McBride | Jim | JMX Services, Inc. | Guest |
| p | Montpool | Rhea | Schneider Electric | Member |
| p | Moreno | Andre | Siemens Energy | Guest |
| p | Narawane | Aniruddha | EATON Corporation | Member |
| p | Nunn | Shawn | Hitachi Energy | Member |

| | | | | |
|---|---|---|---|---|
| p | Nunn | Tommy | ? | Guest |
| p | Ortega | Augustin | Siemens Energy | Guest |
| p | Patel | Dipeshkumar | EATON | Guest |
| p | Peterson | Caroline | Xcel Energy | Member |
| p | Salem | Sherif | Eversource Energy | Guest |
| p | Sandoval | Alberto | EATON Corporation | Guest (RM) |
| p | Saraf | Manish | Hammond Power Solutions | Member |
| p | Shannon | Mike | REA Magnet Wire | Guest |
| p | Shannon | Michael | REA Magnet Wire | Guest |
| p | Sohail | Mohammad Abdullah | Trench Limited | Guest (RM) |
| p | Sohail | Muhammad | Trench Limited | Guest |
| p | Tarango | Erik | Olsun Electric | Guest |
| p | Tatu | Valeriu | Powersmiths | Member |
| p | Tedesco | Joseph | Hitachi Energy | Member |
| p | Tendulkar | Vijay | Eaton Santa Ana, CA | Member |
| p | Tsai | Steve | JST Power Equipment | Guest |
| p | Walker | David | MGM Transformer Company | Member |
| p | Wang | Evanne | DuPont | Guest |
| p | Weyandt | Paul | Schneider Electric | Guest (RM) |
| p | Weyer | Daniel | Monolith | Guest |
| p | White | Joe | Power Engineering | Guest |
| p | Wicks | Roger | DuPont | Guest |
| p | Wong | Terry | Trench Ltd. | Guest |

3) **IEEE 259** – summary given by Joe Tedesco (Hitachi) for Dave Stankes (3M). The Chair asks if WG can extend PAR without SC approval. Tom Prevost (Weidmann) confirms that the WG can extend a PAR without SC approval. No other comments.

The Working Group met in Regency (A) Meeting room. The meeting was called to order at 3:15 PM by Vice Chair Joseph Tedesco.

Chair made opening comments.

In the interest of time, introductions were foregone. WG Roster has been distributed and signed.

Attendance:
- 34 total participants
- 11 Members
- 23 guests

There were 11 out of 17 members present. A quorum was present.

**WG Meeting Agenda**

1. **Introductions**
2. **Attendance & determination of quorum (17 Members)**
3. **Approval of agenda**
4. **Approval of Fall 2023 and 2/21 (Virtual) meeting minutes**
5. **Review of test procedure flow chart (Tim-Felix Mai)**
6. **Review revised clauses in Draft 4 including:**
7. **Clause 5. Insulation Test Specimens**
8. **Clauses 5.1 Screening Tests and 6.1 Screening tests (Optional) Clause 5.2 Design screening test (optional) and Clause 5.3 Screening test**
9. **Clause 7. Modifications to and existing system (Evanne Wang)**
10. **Clause 8. Data analysis (Roger Wicks)**
11. **Par Extension Request**
12. **Meeting Adjournment**

Joe showed the Participant behavior in IEEE-SA activities, patent, and copyright slides. 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.
The agenda was approved unanimously without discussion.
Motion. Aniruddha, Second: Vijay

The WG Meeting minutes of the Fall 2023 and 2/21 virtual Meeting were approved unanimously without discussion.
Motion: Aniruddha, Second: Solomon

**Old Business:**
Joe showed the revised scope and purpose.
The test procedure flow chart reviewed and presented by Tim-Felix Mai
Discussion about the modification section 7. The wording cannot be simply copied from C7.12.60.
TF led by Evanne will come up with a proposal for next Meeting (Solomon will assist).
Typo in Table 1 section 6.1 is 504 to 480 should be 504 to 840.
In the draft the flow chart has a black background. Casey asked to change this to a white background. Tim-Felix will prepare a new version of the flow chart.

As Ed is retired Joe asked the group for a new volunteer for the test objects. No new volunteer found.
As Roger is retiring soon Joe asked the group for a new volunteer for the testing section. No new volunteer found maybe Dave can assist.
Mechanical stress, thermal exposure and moisture exposure will still be reviewed by Tim-Felix. Joe offered to help.

Motion: PAR extension for two years
Motion: Colby, Second: Aniruddha
Motion approved unanimously without discussion.

**New Business:**
None

The meeting was adjourned at 4:10 PM.

| | Last Name | First Name | Company | |
|---|---|---|---|---|
| 1 | Ballard | Robert | DuPont | Member |
| 2 | Chiang | Solomon | The Gund Company | Member |
| 3 | Lee | Moonhee | Hammond Power Solution | Member |
| 4 | Levin | Alexander | Weidmann | Member |
| 5 | Lovins | Colby | Federal Pacific | Member |
| 6 | Mai | Tim-Felix | Siemens Energy | Secretary |
| 7 | Narawane | Aniruddha | Eaton Corporation | Member |
| 8 | Tedesco | Joseph | Hitachi Energy | Vice Chair |
| 9 | Tendulkar | Vijay | Eaton | Member |
| 10 | Wicks | Roger | DuPont | Member |
| 11 | Casallas | Camilo | Trench Limited | Guest |
| 12 | Mendez | Luis | JST Power Equipment | Guest |
| 13 | Grajeda | Rafael | Eaton | Guest |
| 14 | Patel | Dipesh | Eaton | Guest |
| 15 | Gaon | Alexander | Coil Innovation | Guest |

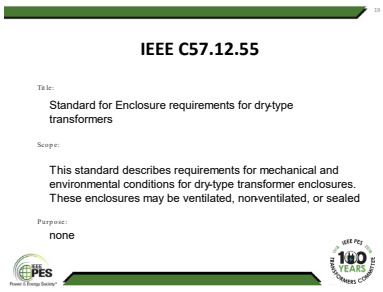
| | | | | |
|---|---|---|---|---|
| 16 | Fryer | Bob | Dupont | Guest |
| 17 | Wang | Evanne | DuPont | Requesting Membership |
| 18 | Chen | Binzhan | BC Hydro | Guest |
| 19 | Fu | Yao | BC Hydro | Guest |
| 20 | Yegor | Melo | BC Hydro | Guest |
| 21 | Yuan | Guang | Hitachi Energy | Guest |
| 22 | Erik | Tarango | Olsun Electric | Guest |
| 23 | Fu | Renjie | Ermco / V&F | Guest |
| 24 | Jarosz | Patrycja | IEEE SA | Guest |
| 25 | Patel | Vinay | Con Edison | Member |
| 26 | Peterson | Caroline | Xcel Energy | Guest |
| 27 | Pointer | Klaus | Trench Austria | Guest |
| 28 | Sandoval | Alberto | Eaton | Guest |
| 29 | Sharp | Michael | Trench LTD | Guest |
| 30 | Tatu | Val | Powersmiths | Guest |
| 31 | Klein | Ken | Johnson | Guest |
| 32 | Riberio | Marilia | GE | Guest |
| 33 | Matthew | Sze | Omicron Electronics | Guest |
| 34 | Moreno | Andre | Siemens Energy | Guest |
| 35 | Robalino | Diego | Megger | Guest |
| 36 | Nunn | Tommy | JST Power Equip. | Guest |
| 37 | Hossain | Saif | Trench Limited | Guest |
| 38 | Wong | Terry | Trench Limited | Guest |
| 39 | Komm | Dave | Hammond Power Solutions | Guest |

| | | | | |
|---|---|---|---|---|
| 40 | Reiss | Tony | | Guest |
| 41 | Wirth | Stefan | Coil Innovation | Guest |
| 42 | Ortega | Agostin | Siemens Energy | Guest |
| 43 | Mihir | Amin | Eaton | Guest |
| 44 | Tekin | Dervis | GE | Guest |

4) **C57.12.55**

Shawn Nunn (Hitachi ABB Power Grid) makes a motion to submit the PAR for C57.12.55 that will become IEEE and no longer ANSI to use the title and scope shown on the screen without a purpose. Seconded by Aniruddha Narawane (Eaton). Manish Saraf (Hammond Power Solutions) comments that in the industry, he's not sure if it's a requirement to revise the standard because the numerous other enclosure standards commonly in use in the industry make an IEEE enclosure standard unnecessary. The Chair takes a vote for the motion:

a. For the motion: 19 for, 0 against, 1 abstention. Motion carries.




b.

The meeting was called to order at 4:45 pm by Chair Shawn Nunn.

The chair made opening comments and discussed the history of the document.

The attendance roster was circulated with the instructions to indicate if the attendees would like to become a member of the Task Force.

After circulation, there were 16 participants, 8 individuals requested membership, and 8 guests. Meeting quorum was established since this was the first meeting of the taskforce. Please see the list of attendees at the end of the report.

The Chair reviewed the copyright and patent slides. No patent claims were stated.

The Chair reviewed the agenda for the meeting.

**Motion by Casey Ballard to approve the Agenda.**

- Motion seconded by Tim-Felix Mai
- No discussion
- Vote was held. 6 Approved, 0 Disapproved, 1 Abstention

**New Business:**

The Chair displayed the current document Title and proposed Title. Much discussion on what the document should contain. Discussion centered around if this should only be an enclosure document or still include the other items within the document. For example, thermal and sampling selection.
This led to a discussion about Scope expansion and the risk of conflicting with other IEEE standards.
Another point mentioned was that there may be transformer applications today there were not around when this document was last revised.

The proposed Title "IEEE Standard for Dry-Type Transformers Used in Unit Installations, Including Unit Substations" was word smithed by the group to the following, "Enclosure requirements for dry-type transformers".

Question was raised on whether to include "IEEE Standard" at the beginning of the Title. The consensus was that this was not required for the PAR creation. IEEE would add the appropriate leading text.

**Motion by Casey Ballard to change the Title to "Standard for Enclosure requirements for for dry-type transformers"**

- Motion was seconded by Joe Tedesco.
- Discussion – Brief group discussion on whether the document should remain a standard. The consensus of the group was to retain the "Standard" designation.
- The chair called for a vote on the motion.
- 6 Approve, 0 Disapprove, 1 Abstention.
- Motion Passed.

The Chair then displays the current and proposed Scope and Purpose.
Discussion started with the Scope and what the Scope should include.
Comment was made that a OEM could put equipment other than transformers in the enclosure.
Another comment was made surrounding environmental conditions and what should be included.
The terms ventilated, non-ventilated, sealed, single-phase and polyphase were discussed and whether or not they should be removed or left in the Scope.
After the discussion concluded, the Proposed Scope presented by the Chair…

"This standard describes electrical and mechanical requirements for dry-type distribution, power transformers and for autotransformers. Such transformers may be remotely or integrally associated with primary or secondary switchgear or substations, or both. These transformers may be either single-phase or polyphase, with ventilated, nonventilated, or scaled enclosures. This standard covers all Unit installed and unit substation Dry-Type transformers except for the transformers as described as exceptions in IEEE Std. C57.12.01."

Was revised to…

"This standard describes the requirements for mechanical and environmental conditions for dry-type transformer enclosures. These enclosures may be ventilated, non-ventilated, or sealed."

**Motion by Ken Klein to change the Scope to "This standard describes requirements for mechanical and environmental conditions for dry-type transformer enclosures. These enclosures may be ventilated, non-ventilated, or sealed."**

- Motion was seconded by Tim-Felix Mai.
- There was no Discussion.
- The chair called for a vote on the motion.
- 6 Approve, 0 Disapprove, 1 Abstention.
- Motion Passed.

The Chair then displayed the current and proposed Purpose.
After a brief discussion the consensus of the group was not to include a Purpose since the Title and Scope sufficiently explains the document. A vote was not required.

Next, the following motion was stated…

**Motion by Joe Tedesco to take the Title and Scope, as written, to the Dry-Type Subcommittee for PAR approval.**

- Motion was seconded by Ken Klein.
- There was no Discussion.
- The chair called for a vote on the motion.
- 6 Approve, 0 Disapprove, 1 Abstention.
- Motion Passed.

With no further business, the meeting was adjourned.

Chair: Shawn Nunn
Secretary: Colby Lovins

**Task Force for PAR Development of C57.12.55 Meeting Attendees – Spring 2024**

| FIRST NAME | LAST NAME | AFFILIATION | GUEST / MEMBER |
|---|---|---|---|
| Shawn | Nunn | Hitachi Energy | Chair |
| Colby | Lovins | Federal Pacific | Secretary |
| Casey | Ballard | Dupont | Member |
| Joseph | Tedesco | Hitachi Energy | Member |
| Tim-Felix | Mai | Siemens Energy | Member |
| Ken | Klein | Johnson | Member |
| Tommy | Nunn | JST Power Equipment | Guest |
| Luis | Mendez | JST Power Equipment | Guest |
| Steve | Tsai | JST Power Equipment | Guest |
| Rob | Ghosh | GE | Vice Chair |
| Erik | Tarango | - | Guest |
| Bob | Fyrer | Dupont | Member |
| Andre | Moreno | Siemens Energy | Guest |
| Marnie | Roussell | Entergy | Guest |
| Ed | Arevib | BPA | Guest |
| Roger | Wicks | Dupont | Guest |

5) **C57.94** – summary given by Ken Klein (Johnson Coil) – no comments from the SC.

The Working Group met in Roanoke Meeting room. The meeting was called to order at 8:00 AM by Chair Ken Klein.

Chair made opening comments.

WG Roster has been distributed and signed.

Attendance:

- 42 total participants
- 9 Members
- 33 guests

There were 9 out of 15 members present. A quorum was present.

**WG Meeting Agenda**

1. Welcome & chair's remarks

2. Introduction of attendees, attendance & determination of quorum

3. Approval of agenda

4. Approval of minutes from Fall 2023 meeting

5. Call for essential Patents & IEEE SA Copyright Policy review

6. Review of TF sections

    o Normative references: Roger

    o Definitions: Tim-Felix (Complete)

    o Application: Colby & Chris (Complete Fall 2022)

    o Installation: Dave (Complete Fall 2022)

    o Testing: Kerwin & Joe (Complete Spring 2023)

    o Operation: Casey (Complete Fall 2024)

    o Maintenance: Ken Klein & Kerwin - Ryan Hogg notes & new drying graph

7. Meeting Adjournment

The agenda was approved unanimously without discussion.

Motion: Joe, Second: Colby

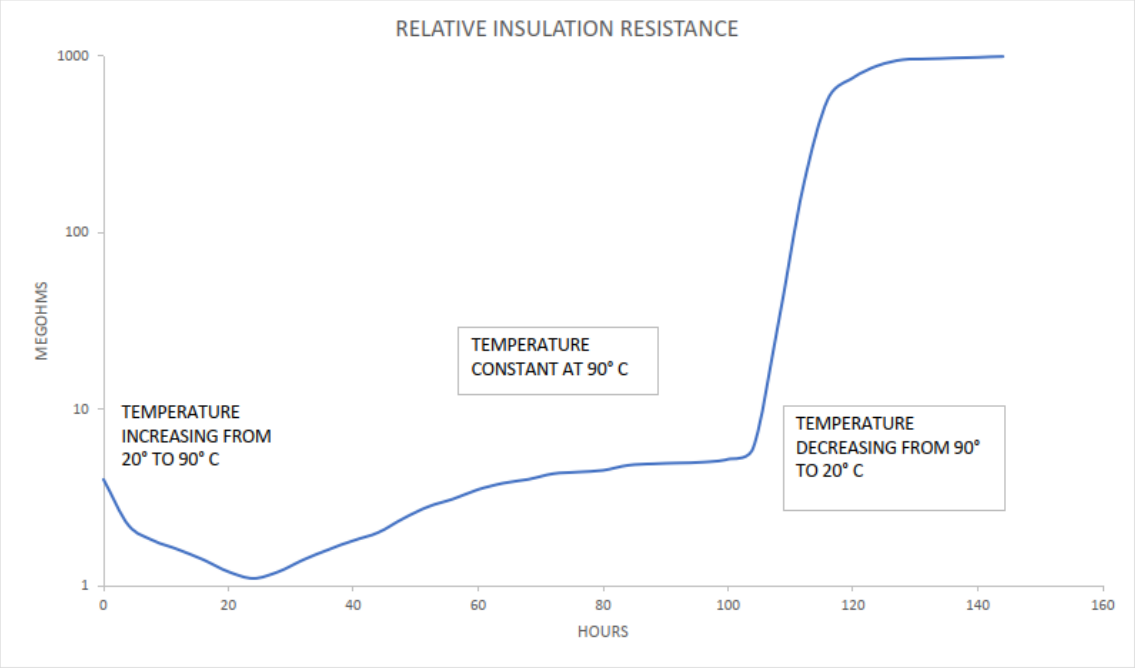
The WG Meeting minutes of the Fall 2023 Meeting were approved unanimously without discussion.

Motion: Casey, Second: Joe

The chair presented the information on Patent Disclosures and IEEE SA Copyright Policy. He asked the group to report any relevant patent issues – None were communicated.**Old Business:**

Ryan Hogg presented procedures from the Bureau of Reclamation like performing thermographic scans, checking temperature alarms, check fans, ... There was a discussion in the group what and how to include this in the document. Ryan will prepare a more detailed proposal by mid-April and sent it to the chair.

The chair presented a typical insulation resistance curve. The group commented that time and resistance values should be removed:




The wording is already in section 8.3.5.2. The old figure 1 will be replaced by the new updated figure. Solomon stated that it would be helpful to have a information that the shape of the curve can be different due to different environmental conditions.

Roger mentioned that as IEEE Std C62.2 is not used / referred in the body of the document it should be moved to the bibliography. The chair will do an editorial review of the normative reference and bibliography to check if all the standards are in the correct place.

The current draft is not in the latest IEEE template. The chair will update the current document to the latest template.

**New Business:**

The latest Draft D4 will be sent out end of April to the group for a straw ballot. The next meeting is planned to be the last meeting. At this point no new members will be accepted.

The meeting was adjourned, without objection, at 8:50 AM.

The WG will meet again at the Fall 2024 meeting in St. Louis, Missouri USA, October 27-31.

Chair: Ken Klein

(Vice-Chair: David Stankes)

Secretary: Tim-Felix Mai

**Participation list:**

| | First Name | Last Name | Company | |
|---|---|---|---|---|
| 1 | Robert | Ballard | DuPont | Member |
| 2 | Tim-Felix | Mai | Siemens Energy | Secretary |
| 3 | Ken | Klein | Johnson | Chair |
| 4 | Joseph | Tedesco | Hitachi Energy | Member |
| 5 | Colby | Lovins | Federal Pacific | Member |
| 6 | Solomon | Chiang | TGC | Member |
| 7 | Vijay | Tendulkar | Eaton | Guest |
| 8 | Shawn | Nunn | Hitachi Energy | Guest |
| 9 | Erik | Tarango | Olsun Electric | Guest |
| 10 | Bob | Fyrer | DuPont | Guest |
| 11 | Andre | Moreno | Siemens Energy | Guest |
| 12 | Rafael | Garjeda | Eaton | Guest |
| 13 | Ryan | Hogg | Bureau of Reclamation | Guest |
| 14 | Aniruddha | Narawane | Eaton | Guest |
| 15 | Patrycja | Jarosz | IEEE SA | Guest |
| 16 | Val | Tatu | Powersmiths | Guest |
| 17 | Guang | Yuan | Hitachi Energy | Guest |
| 18 | Daniel | Weyer | Monolith | Guest |
| 19 | Tommy | Nunn | Comcast | Guest |
| 20 | Agustin | Ortega | Siemens Energy | Guest |
| 21 | Renjie | Fu | Ermco / V&F Transformer | Guest |
| 22 | Pollaro | Dominic | Nass | Guest |
| 23 | Roger | Wicks | DuPont | Member |
| 24 | Sherif | Salem | Eversource Energy | Guest |
| 25 | Dave | Komm | Hammond Power Solutions | Guest |
| 26 | Alberto | Sandoval | Eaton | Guest |
| 27 | Brayan | Dizb | Siemens Energy | Guest |
| 28 | Marko | Teofanovic | Ontario Power | Guest |
| 29 | Manish | Saraf | Hammond Power | Guest |
| 30 | Oscar | Castavon | Siemens Energy | Guest |

| | | | | |
|---|---|---|---|---|
| 31 | Kumar | Mani | Duke Energy | Guest |
| 32 | Dipesh | Patel | Eaton | Guest |
| 33 | Sanford | Fong | GA Power | Guest |
| 34 | Luis | Mendez | JST Power | Guest |
| 35 | Pavlo | Bautista | Enmax | Guest |
| 36 | Sami | Debass | Epri | Guest |
| 37 | Bjorn | Vaagensmith | Idaho National | Guest |
| 38 | Jon | Bender | W.E. | Guest |
| 39 | Evanne | Wang | DuPont | Guest |
| 40 | Mihir | Amin | Eaton | Guest |
| 41 | Gonzals | ??? | South California Edison | Guest |
| 42 | David | Walker | MGM Transformer | Guest |

6) **C57.96** – summary given by Aniruddha Narawane (Eaton). Aniruddha comments that this document is close to completion and the intent is to not have any more meetings. Aniruddha makes a motion that: if the WG has a super majority vote, the SC would also take a ballot conducted via email. This was seconded by Mohammad Iman (MGM Transformers) and was unanimously approved.

Chair: Aniruddha Narawane

Vice Chair: Iman Mohammed

Secretary: Kerwin Stretch (Not Present)

---

- Meeting was called to order at 11:00 AM March 12, 2024, with 10 members and 28 guests. 10 out of 18 members were present and a quorum was achieved.
- Slides of IEEE Patent and copyright material were shown, and no patent and copyright claims were brought to the notice of chair and the group.
- Vijay Tendulkar motioned to approve the agenda as it was submitted and Manish Saraf 2nd it. The agenda was approved with no objection.
- Tim Felix motioned to approve the minutes of the last meeting in Kansas City and Sam Debass second. Minutes of the last was approved with no objection.
- It was discussed to add the calculator prepared by Manish Saraf as an annex to the document. Manich Saraf motioned to add Excel calculator to annex B. Vijay Tendulkar seconded it. Vote was taken and motion was approved and carried. This will be referred to relevant IEEE authority via Patrycja for approval and action.
- Annex C examples checked for errors, and none found.
- Motion was made by Colby Lovins to accept equation 12 as is with a note refer C57.134 for “n” exponent instead of mentioning the value. Casey Ballard seconded it. Vote was taken and it was approved and subsequently motion carried.

- There was discussion about example in Annex C and the alignment with C57.12.91 about the max overload on transformer while using the calculation example which is above the limit. A note was recommended to be added to notify the user that the calculation example is approximate and for detailed calculation another method can be used. Manish motioned to add line 5 & 6 in C1 and Vijay Tendulkar seconded it. Vote was taken and approved with no objection. Motion carried.
- Casey Ballard motioned to go to E ballot after chair prepares draft 3 to include all changes made during this meeting. Vijay Tendulkar seconded it. Vote was taken and motion was approved with no objection.
- Roger Wicks agreed to help to calculate the values for some tables based on 155 C with additional review and from Aniruddha Narawane and Casey Ballard.
- Joe Tedesco motioned to form a Comment resolution group and empower the group to resolve the comments without the need to come back to WG. Casey Ballard seconded it. Vote was taken and approved with no objection.
- A CRG to be formed chaired by Manish Saraf with the help of Joe Tedesco, Tim Felix, Colby Lovins, Casey Ballard, Mike Iman, and Aniruddha Narawane to review all of the changes.
- With intent to go to ballot after the draft circulation well before Fall 24 meeting, WG does not plan to meet at St. Louis during fall 2024 meeting.

With no other new business meeting was adjourned at 12:15 PM.

# Attendance

| Status | Last Name | First Name | Affiliation |
|---|---|---|---|
| Member | Ballard | Robert | DuPont |
| Member | Debass | Samson | EPRI |
| Member | Hernandez | Giovanni | Virginia Transformer Corp. |
| Guest | Hernandez | Sergio | Hammond Power Solutions |
| Guest | Hernandez | Ronald | Doble |
| Guest | Hopkinson | Phil | Hvolt, Inc. |
| Vice-Chair | Iman | Mohammad | MGM Transformer Company |
| Member | Klein | Ken | Johnson Coil |

| | | | |
|---|---|---|---|
| Guest | Lambert | Jason | JST Power |
| Guest | Leaf | Gustavo | Dominion Energy |
| Member | Lee | Moonhee | Hammond Power Solutions |
| Guest | Levin | Aleksandr | Weidman Electrical Technology |
| Member | Lovins | Colby | Federal Pacific |
| Member | Mahajan | Kushal | EATON Corporation |
| Member | Mai | Tim-Felix | Siemens Energy |
| Guest | Mani | Kumar | Duke Energy |
| Guest | Martinez | Joaquin | Siemens Energy |
| Member | Montpool | Rhea | Schneider Electric |
| Guest | Nims | Joe | Allen & Hashall |
| Member | Nunn | Shawn | Hitachi Energy |
| Guest | Pointner | Klaus | Trench Austria |
| Member | Saraf | Manish | Hammond Power Solutions |
| Guest | Selvaraj | Pugal | Virginia Transformer Corp. |
| Guest | Sharifi | Masoud | Siemens Gamesa |
| Guest | Shrewsbury | Justin | AMR PEMCO |
| Guest | Stankes | David | 3M |
| Secretary | Stretch | Kerwin | Siemens Energy |
| Guest | Tatu | Val | Powersmiths |
| Member | Tedesco | Joseph | Hitachi Energy |
| Member | Tendulkar | Vijay | EATON Corporation |
| Guest | Walker | David | MGM Transformer Company |
| Guest | Wazir | Muhammad Areeb | EATON Corporation |

| | | | |
|---|---|---|---|
| Guest | Weisenser | Matt | PacificCorp |

7) **C57.12.91** – summary given by Dave Walker (MGM Transformers) – no comments from SC.

The Working Group met at the Hyatt Regency – Regency E/F Conference Room. The meeting was called to order at 4:45 PM by Chair, David Walker

Chair made opening comments.

16 of 24 members in attendance. Quorum was met.

Approval of Agenda: The Fall agenda was approved unanimously without discussion.
Motion: Aniruddha Narawene
Second: Vijay Tendulkar

Approval of Minutes: The Fall 2023 minutes were approved unanimously without discussion.
Motion: Ken Klein
Second: Manish Saraf

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

Copyright Notice: The Chair presented the IEEE_SA Copyright Policy. No discussion.

**Old Business**

- **Review of PAR timeline – Expires 12/31/2026**
  - Last meeting to make changes most likely Spring 2025

- **Updating exponents for temperature rise correction factors –Manish Saraf**
  - Proposal to update temperature rise correction factors (Equations 25, 26, 27, and 42) based on testing
  - Manish Saraf presented data from units tested from 2 transformers. One unit showed that current correction factor of 1 is correct. The other unit showed an accurate exponent of approx. 0.8.
  - IEC standard is currently using 0.9 exponent.

  - Motion by Manish Saraf:
    - No change to the Ambient Air (AA) cooled units.
    - Adjust the exponent for Forced Air (FA) Cooled Units to 0.9
  - 2nd – Sergio Hernandez Cano

  - Discussion:

    - Should there be a note stating why we are changing?
    - Does the amount of fan cooling change the exponent?

        - Should IEC values be used.
        - Turbulent vs. laminar flow will change the exponent.
        - Duct size could change the exponent as well. Could vary by manufacturer.
    - Manish Saraf withdrew the motion until more data can be presented.

**What to do with fans during AF testing**

Current state:

- Clause 11.1 requires fans to be on during the AF test
- Clause 11.5 requires fans to be off prior to hot-resistance measurements
- Clause 13.3.3 requires fans to be on during a sound test
- Other tests do not specify any difference for AF testing

- Proposal to Change Clause 11.5 to read:
- The steady-state temperature rise is reached when the surface temperature rises over ambient of all surface temperature measurements required in 11.3 become stable, which is defined as a variation of no more than 2 °C during a consecutive 3 h period. When the temperature rises become stable, the test voltage and current shall be removed, and the fans, if used, shall be left on for the duration of the resistance measurements.

- Manish Saraf presented graphs showing there is an initial temperature spike when the fans are turned off that impacts the cooling curve and temperature rise calculations. If the fans remain on during while the measurements are taken, there is no spike and the cooling curve is as expected.

- Motion was withdrawn until more data can be presented.

**Voltage correction factor in no Load Loss Test –**

- This topic is moved to the agenda for the Fall 2024 meeting.
- Manish Saraf will provide a written proposal at the next meeting including proposed equations.

**Current Tolerance During Load Loss Measurement**

Current State:

- 9.3.4.1 Two-winding transformers and autotransformers
    - ….With one winding and associated leads or bus bar short-circuited at the terminals, a voltage of sufficient magnitude at rated frequency is applied to the other winding and associated leads or bus bar at the terminals and adjusted to circulate rated current in the excited winding and associated leads or bus bar…

- What happens if the test equipment can't reach rated current (low voltage and high kVA)?
- Scale the losses by $I^2$?
- Some other correction?
- Does it depend on how close it is?
- Neither C57.12.90 nor C57.12.91 mention the topic.

- Valeriu Tatu has data relevant to this topic that will be presented at the Fall 2024 meeting.
- Topic was added to the Fall 2024 Agenda.

**Add a load loss metering angle correction**

- Proposal:
  - Add text, equations, and tables from Clauses 9.4 and 9.4.1 from C57.12.90
  - Motion from Joe Tedesco to put the text, equations, and tables from C57.12.90-9.4 and 9.4.1 into an annex in C57.12.91
  - 2nd : Casey Ballard
  - Vote: Unanimous approval

**Short Circuit of axially split windings (as per C57.12.90) –**

- C57.12.90 allows short circuiting testing where each winding is short circuited one winding at a time which is "worst case" This testing is currently not included in C57.12.91
- Tim-Felix Mai made a motion to take the short-circuit test information and procedure from C57.12.90 and add it into C57.12.91.
- 2nd : Casey Ballard
- Vote: Unanimous approval

**Impulse Testing- Low voltage/impedance windings**

- Impulse testing low voltage windings (<600V) can be difficult.
- It's almost impossible to get a good wave shape
- Question: Should we add something to address this topic?
- This topic was previously discussed – No Change is needed

**New Business - None**

**Adjourned at 6:00**

The Working Group will meet again at the Spring 2024 meeting,

Chair: David Walker
Vice-Chair: Tim-Felix Mai
Secretary: Rhea Montpool

**Participation list:**

| Last Name | First Name | Company |
|---|---|---|
| Amin | Mihir | Eaton |

| | | |
|---|---|---|
| Ballard | Robert | DuPont |
| Britton | Jeffrey | Phenix Tech |
| Chrysler | Rhett | Ermco |
| Fu | Renjie | Ermco |
| Fyrer | Bob | DuPont |
| Garcia | Miguel | Hitachi Energy |
| Grajeda | Rafael | Eaton |
| Gupta | Ravi | Megger |
| Hernandez | Giovanni | Virginia Transformer |
| Hernandez Cano | Sergio | Hammond Power Solutions |
| Iman | Mike | MGM |
| Jarosz | Patrycja | IEEE SA |
| Klein | Ken | Johnson |
| Lee | Moonhee | Hammond Power Solutions |
| Lively | Parry | Tempec |
| Lovins | Colby | Federal Pacific Transformer |
| Mai | Tim-Felix | Siemens Energy |
| Mendez | Luis | JST Power Equipment |
| Moreno | Andre | Siemens Energy |
| Narawane | Aniruddha | Eaton |
| Nunn | Shawn | Hitachi Energy |
| Nunn | Tommy | JST |
| Ortega | Agustin | Siemens Energy |
| Patel | Dipesh | Eaton |
| Pepe | Harry | Phenix Tech |
| Sandoval | Alberto | Eaton |
| Saraf | Manish | Hammond Power Solutions |
| Selvaroy | Pugel | VA Transformer |
| Tarango | Erik | Olsun |
| Tatu | Valeriu | Powersmiths |
| Tedesco | Joseph | Hitachi Energy |
| Tendulkar | Vijay | Eaton |
| Tsai | Steve | JST Power Equipment |
| Walker | David | MGM |
| Wang | Evanne | DuPont |
| Weyandt | Paul | Schneider Electric |
| Wicks | Roger | DuPont |
| Yuan | Guang | Hitachi Energy |

The documents that do not meet face-to-face:

8) C57.16 Air core reactors – a summary is given Arturo Del Rio (Siemens Energy) – no comments from SC.
   Ballot Pool being formed, and draft will be submitted to MEC for review

9) C57.12.52 Sealed dry type – a summary is given by Joe Tedesco (Hitachi) - no comments from SC.
   On the March 20th RevCom agenda

10) C57.134 Hottest spot temp – a summary is given by Colby Lovins (Fed Pac) – no comments from SC
    On the March 20th RevCom agenda

11) C57.124 Partial discharge – a summary is given by Tom Prevost (Weidmann). Notes that Tom will be looking for help in conducting CAD work.
    Ballot Pool formed and MEC review complete, will open ballot shortly

12) C57.12.59 Through-fault current – a summary is given by the Chair. The previous Chair of this WG, Derek Foster, will be unable to continue this work. The PAR has already been updated and passed, and the Chair is looking for a volunteer to do this work. Paul Weyandt (Schneider Electric) volunteers to conduct work as the Chair of C57.12.59.

Old Business

- No comments from SC.

New Business

Dan Mulkey (Mulkey Engineering, Inc.) says that for C57.12.52, the scope says it does not apply to any transformer. He notes that the scope says that it does not apply to “ventilated transformers” and does not apply to “non-ventilated transformers”. He notes that “non-ventilated” cancels “ventilated”, which indicates that this standard will exclude everything. He also notes that “non-ventilated dry type” and “ventilated dry-type” transformers are called out in 12.80, but that is not the same definitions as 12.52. Jerry Murphy (Reedy Creek Energy Services) agrees that it’s not clear if the scope of transformer is ventilated or not-ventilated, particularly when placed in the same sentence.

Dan points out a second problem, which is the term “loading” is used when the term “capability” should be used.

Phil Hopkinson (HVolt) asks if Dan has any fixes, and Dan says he has two fixes:

1) The term “loading” should be replaced with “capability” when referring to dry-type transformers.
2) To define scope of transformers, Dan proposes to use the following wording: “transformers with a ventilated cabinet” or “transformer with a non-ventilated cabinet and sealed transformers”.

Dan agrees to send the new proposed wording to the SC Chair prior to the start of the F24 meeting.

No additional input or comments were received, and the meeting was adjourned at 2:30 pm PT.

Respectfully submitted,

Casey Ballard, Chair
Dave Walker, Vice-Chair
Dave Stankes, Secretary

DTSC Spring 2024 Meeting Attendance List

| Last Name | First Name | Role | Company |
|---|---|---|---|
| Amin | Mihir | Guest | Eaton |
| Ballard | Robert | Chair | DuPont |
| Casallas | Camilo | Guest | Trench Limited |
| Chen | Binzhan | Guest | BC Hydro |
| Chiang | Solomon | Member | The Gund Company |
| Del Rio | J. Arturo | Member | Siemens Energy |
| Fyrer | Bob | Guest | DuPont |
| Garcia | Miguel | Guest | Hitachi Energy |
| Ghosh | Rob | Member | GE |
| Grajeda | Rafael | Guest | Eaton |
| Hernandez Cano | Sergio | Member | Hammond Power Solutions |
| Hopkinson | Philip | Member | HVOLT Inc. |
| Hossain | Saif | Guest | Trench Limited |
| Iman | Mohammad | Member | MGM Transformer Company |
| Jarosz | Patrycja | Guest | IEEE-SA |
| John | John | Member | Virginia Transformer Corp. |
| Klein | Ken | Member | Johnson Coil |
| Lee | Moonhee | Member | Hammond Power Solutions |
| Levin | Aleksandr | Member | Weidmann Electrical Technology |
| Lovins | Colby | Member | Federal Pacific Transformer |
| Mai | Tim-Felix | Member | Siemens Energy |
| Montpool | Rhea | Member | Schneider Electric |
| Moreno | Andre | Guest | Siemens Energy |
| Murphy | Jerry | Guest | Reedy Creek Energy Services |
| Narawane | Aniruddha | Member | Eaton |
| Nunn | Shawn | Member | Hitachi ABB Power Grids |
| Ortega | Agustin | Guest | Siemens Energy |
| Peterson | Caroline | Guest | Xcel Energy |
| Pointner | Klaus | Member | Trench Austria GmbH |
| Prevost | Thomas | Member | Weidmann Electrical Technology |
| Radbrandt | Ulf | Guest | Hitachi ABB Power Grids |
| Sandoval Moreno | Alberto | Guest | EATON Corporation |
| Saraf | Manish | Member | Hammond Power Solutions |
| Sharp | Michael | Member | Trench Limited |
| Tarango | Erik | Guest | Olsun Electrics Corporation |
| Tatu | Valeriu | Guest | Powersmiths International |
| Tedesco | Joseph | Member | Hitachi Energy |

| | | | |
|---|---|---|---|
| Tendulkar | Vijay | Member | Eaton |
| Walker | David | Vice Chair | MGM Transformer Company |
| Wang | Evanne | Guest | Dupont |
| Wicks | Roger | Guest | DuPont |
| Wong | Terry | Guest | Trench LTD |
| Yuan | Guang | Guest | Hitachi Energy |
| | | | |
| Mulkey | Daniel | Guest | Mulkey Engineering Inc. |
| Salem | Shenif | Guest | Eversource Energy |
| Komm | Dave | Guest | Hammond Power Solutions |
| Coughlan | Will | Guest | Metglas, Inc. |
| Patel | Dipesh | Guest | Eaton |
| Weyandt | Paul | Guest | Schneider Electric |
| Faye | Richard | Guest | Eaton |
| Rohrer | David | Guest | First Energy |
| Knapp | Evan | Guest | Eaton |
| Debass | Samuel | Guest | EPRI |