Annex D Dry Type Transformers Subcommittee

Wednesday March 26, 2025

IEEE Transformer DTSC Spring 2025 Denver, CO

Chair: **David Walker**

Vice-Chair: **Aniruddha Narawane**

Secretary: **Dave Stankes**

D.1 Introductions, Chairs Remarks

The Dry-type Transformers Subcommittee (DTSC) met in the Centennial FG room at the Hyatt Regency St. Louis Denver on March 26, 2025 at 1:30 PM (MST).

The 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.

Chair requested TF and WG chairs to provide a short summary of what was accomplished this week to be shared at Closing Session. Meeting minutes requested to be forwarded to Dave Stankes asap as DTSC Meeting minutes must be submitted by May 8th. Reviewed items that should be included in the meeting minutes including attendee list (do not include e-mail addresses) and whether the WG plans to meet during next in-person meeting.

Chair reminded WG and TF Chairs that copyright and patent slides may be sent out prior to scheduled meetings to eliminate the need to present the slides at the meeting. Chair also reminded attendees to obtain copyright approval before presenting information owned by their employer.

Chair encouraged the use of virtual meetings to help WG meet project deadlines. Requested that invitations for virtual WG meetings be posted on the Transformer Committee website. Patrycja Jarosz should be invited to attend scheduled WG meetings. There is no requirement that she attend TF meetings.

D.2 Attendance and Quorum

The chair presented a slide with the names of all current members. There were 49 attendees. 20 of the 32 members of the DTSC were present, so a quorum was reached. Five attendees requested membership.

A roster was circulated. Chair requested attendees to make that their e-mail address on file by the DTSC was accurate in order to receive future correspondence.

D.3 Approval of Agenda and Minutes

The chair entertained a motion to approve the planned agenda that was displayed at the meeting.

Motion to Approve – Aniruddha Narawane
Seconded – Tim-Felix Mai
Agenda was approved unanimously.

The chair entertained a motion to approve the Fall 2024 DTS meeting minutes that were posted on the Transformer Committee website.

Motion to Approve – Joe Tedesco
Seconded – Aniruddha Narawane
Spring 2024 DTS meeting minutes approved unanimously.

D.4 Working Group/Task Force Reports

Presentation of the reports of the various working groups and task forces. See the following sections for the individual reports:

D.4.1 C57.12.58 Transient Voltage Ken Klein

The Working Group met in Mineral Hall BC 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 via online system.
Attendance:

- 29 total participants - 8 Members - 21guests - 7 guests requested membership
There were 8 out of 11 members present. A quorum was present.

WG Meeting Agenda
1. Welcome & chair's remarks
2. Introduction of attendees, Check for members/attendance
3. Approval of agenda & Fall study group minutes
4. Call for essential Patents & IEEE SA Copyright Policy review
5. Motion to take to Sub Committee to go to ballot
6. Create CRG
7. Guide Section looking for volunteers to review if needed
8. Meeting Adjournment

The Chair had distributed the minutes of the last meeting. He asked for a motion to approve the minutes. Bob Fryer moved to accept the minutes, and Chris Powell seconded the motion. There was no discussion, and approval of both sets of minutes was unanimous.

The Chair asked for a motion to approve the agenda. Joseph Tedesco moved to accept the agenda, with David Walker seconding the motion. There was no discussion, and approval of the agenda was unanimous.

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.

Discussion about if or if not to include simulation.

The Title, Scope and Purpose was presented by the chair.

Discussion on make some changes to clause 4.2:.

Old: … of an impulse generator. The surge generator, since it is operating at a low voltage, may generate the wave on a recurrent basis. In fact, observation of voltages.

New: ……of an impulse generator, as described in IEEE Std C57.12.91~~.. The surge generator, since it is operating at a low voltage, may generate the wave on a recurrent basis~~. In fact, observation of voltages..

Motion: Change the wording in 4.2. as shown on the screen by David Walker Second: Joseph Tedesco
In favor: 8 Abstentions: 0 Against: 0 Motion passed

The group discussed to change some wording in clause 5.1.

Old: The circuitry is shown in in Figure 2 in its simplest form to provide the function of voltage generation and 10 wave shaping…
New: One method of generating an appropriate waveform ~~The circuitry~~ is shown in Figure ~~2 in its simplest form to provide the function of voltage generation and 10 wave shaping~~. …

Old: … the impulse generator or IG and the…
New: … the impulse generator ~~or~~ (IG) and the…
Motion: Change the wording in 5.1. as shown on the screen by David Walker Second: Val
In favor: 8 Abstentions: 0 Against: 0 Motion passed

The group discussed to change some wording in clause 5.2.
Old: The time to reach crest for both of these traces…
New: The time to reach crest for both ~~of these~~ traces…

Old: is the inductance in Henries
is the capacitance in farads
New: is the inductance in Henry
is the capacitance in Farad

Old: capacitor and thus increases
New: capacitor and, thus, increases

Old: In order to maintain a high efficiency in charging the front and distributive capacitors…
New: ~~In order~~ To maintain a high efficiency in charging the front and ~~distributive~~ distributed capacitors…

Motion: Change the wording in 5.2. as shown on the screen by Joseph Tedesco Second Val
In favor: 8 Abstentions: 0 Against: 0 Motion passed

The meeting was adjourned, without objection, at 9:15 AM. Will meet again at the Fall Meeting.
Chair: Ken Klein Vice-Chair: Chris Powell Secretary: Tim-Felix Mai

Participation list:

	First Name	Last Name	Company/Affiliation	
1	Kenneth	Klein	Johnson	Chair
2	Tim	Mai	Siemens Energy	Secretary
3	Christopher	Powell	Intermountain Electronics	Vice-chair
4	Bob	Fyrer	EIS	Member
5	David	Walker	MGM Transformer	Member
6	Erik	Tarango Blanco	Olsun electrics	Guest
7	Steve	Tsai	JST power equipment	Guest
8	Orlando	Urbinez	JST POWER	Guest
9	Michael	Sharp	Trench Limited	Guest
10	Guang	Yuan	Hitachi Energy	Guest
11	Moonhee	Lee	Hammond Power Solutions	Member
12	David	Stankes	3M	Guest
13	Kushal	Mahajan	Sungrow	Member
14	Sam	Attaguile	3M Company	Guest
15	Mihir	Amin	Eaton	Guest
16	Dominic	Pollaro	NASS	Guest
17	Moonhee	Lee	Hammond Power Solutions	Member
18	Aniruddha	Narawane	Eaton	Guest
19	Joseph	Tedesco	Hitachi Energy	Member
20	Guang	Yuan	Hitachi energy.com	Member
21	Dipeshkumar	Patel	Hyper Solutions	Member
22	Anna	Zhou	JST Power	Guest
24	Jose	Izquierdo	Siemens energy	Member
25	Manish	Saraf	Hammond Power Solutions	Member
26	Shawn	Nunn	Hitachi Energy	Guest
27	William Sean	O'Keefe	DuPont	Member
28	Benjamin	Guinand	Power Magnetics	Guest
29	Val	Taut	Powersmiths	Member

D.4.2 Revision for IEEE Revision of C57.12.01 Chair Casey Ballard

Chair: Casey Ballard
Vice-Chair/Secretary: Joseph Tedesco

This was the seventh meeting of the IEEE C57.12.01 Working Group. The meeting was held in the Mineral Hall BC meeting room, and Casey Ballard called the meeting to order at 1:45 PM.

Introductions were foregone, with the instruction that the speakers introduce themselves before speaking the first time.

There were 56 people present, 24 members and 32 guests. At the time when a quorum check was made, 22 members were present (2 arrived later). The Working Group had 41 members; therefore, a quorum was reached, and business could proceed. No guests requested membership.

Casey B. reviewed the agenda and asked for a motion to approve it. John John moved to accept the agenda, and Tim-Felix Mai seconded the motion. There was no discussion, and approval of the agenda was unanimous.

Casey B. stated that the minutes of the last meeting had been included in the minutes of the Saint Louis meeting, and he asked for a motion to approve the minutes. Sasha Levin moved to approve the minutes, and Aniruddha Narawane seconded the motion. There was no discussion, and the minutes were approved unanimously.

Casey B. showed the patent slides and asked if anyone knew of any essential patent claims. There were none noted. He showed the copyright and behavior slides.

Old Business:

- A task force had been formed to develop a proposal to change the BILs for each voltage class for dry-type to match the BILs for liquid-immersed transformers.
    - The task force consisted of Phil Hopkinson and Joe Tedesco.
    - Neither had any proposals, so the task force was closed with no further action.
- Ryan Hogg had a proposal to add a note to Table 13 regarding the reason why the kVAs for three-phase Category I and II transformers are not uniformly three times the single-phase kVAs.

Category	Single-phase kVA	Three-phase kVA
I	1 – 500	15 – 500
II	501 - 1667	501 – 5000

    - Ryan H. stated that when he first noticed the problem several years ago, he assumed t was a typo, however, he pointed out that Table 13 has looked like this dating back to the original edition of C57.12.01 published in 1979, meaning that this discrepancy in 500 and 501 kVA was not just a typo. He then went on to explain that Phil H. had previously stated that this was due to an old limit kVA limit for distribution limits, and he wanted to help alleviate this potential confusion for other readers in the future.
    - Therefore, Ryan H. made the following motion:
        - To add the following note with Table 13:
        - Note: The kVA values for single-phase and three-phase in the table intentionally do not adhere to a 1-to-3 ratio for all values. Notably, for values near 500 kVA, the table presents 500 or 501 kVA for both single-phase and three-phase. This is historically due to an old distribution transformer kVA limit.
    - Ken Klein seconded the motion.
    - Before discussion began, Ryan H. stated that he planned to introduce a similar motion in the C57.12.00 working group because that standard has the same discrepancy, and that the outcome of this vote would affect what he proposed there.
    - There was then extensive discussion.

        - There was a concern that adding the note to this table would mean that a similar note could be added to any table where it seemed there might be a discrepancy.
        - It was noted that a reader would likely just assume that the authors meant to write the values as 500 kVA and 501 kVA instead of 1500 kVA and 1501 kVA and not worry about why.
        - There was a comment that perhaps the note to just be simplified, but there was no friendly amendment made.
        - There was discussion about how it would be expected that 3 500 kVA single-phase transformers would be expected to perform the same way as 1 1500 kVA three-phase transformer, but that wouldn't be the case here because a 500 kVA single-phase transformer would be Category I, while a 1500 kVA three-phase transformer would be Category II. However, it was noted that the short circuit testing would be performed on 1 single-phase transformer, not all three, so it is not an inconsistency for them to be different categories.
    - Finally, a vote was taken.
        - The vote was 8 in favor, 11 against, with 3 abstentions. The motion failed.

New Business:

- Val Tatu showed the following:
    - In Clause 7.3.6.1 Equation 2 (and its associated definitions), I is a ratio, specifically the symmetrical short circuit current in multiples of normal base.
    - However, in Clause 7.10.1 Equation 7 (and its associated definitions), the symmetrical short circuit magnitude in times normal rated current is N.
- He proposed the following motion:
    - To replace the symmetrical short circuit current ratio variable, I, in 7.3.6.1 Equation 2 and its definition with the variable N and its definition from 7.10.1 Equation 7.
    - Manish Saraf seconded the motion.
    - There was some discussion.
        - It was pointed out that 7.10.1 refers to a means of calculating the winding temperature during a short circuit that has been deprecated to a second option in favor of a different method.
        - There was a concern that N might be mistaken for something else.
        - It was also noted that I, which is generally regarded as a current, is not actually a current in Equation 2 and so it probably shouldn't be "I" anyway.
    - A vote was taken.
        - The vote 21 in favor, 0 against, with 1 abstention. The motion carried.
- Casey B. asked if there was any further new business, and seeing none, proposed that a vote be taken to go to ballot. After confirming with Patrycja Jarosz that a 2/3 majority was needed to pass, he asked for a motion.

  - Dave Walker moved that the C57.12.01 Working Group send Draft 4 to the Dry-Type subcommittee for SA Ballot. Aniruddha N. seconded the motion. There was no discussion.
  - The vote was unanimous. The motion carried, and Casey B. would present the request to go to ballot at the Dry-Type Subcommittee meeting on March 26.
- Casey B. then asked for a motion that a Comment Resolution Group be created and empowered to make editorial and technical edits to the document based upon the comments received from the submitted comment(s).
  - Sasha L. made the motion, and John J. seconded the motion. There was no discussion.
  - The vote was unanimous. The motion carried.
  - Volunteers were solicited to form the comment resolution group, with the only caveat that there needed to be an odd number. The following members and guests volunteered (listed alphabetically by last name):
    1. Casey Ballard
    2. Jose Izquierdo
    3. John John
    4. Ken Klein
    5. Sasha Levin
    6. Kushal Mahajan
    7. Tim-Felix Mai
    8. Aniruddha Narawane
    9. Manish Saraf
    10. Brian Sonnenberg
    11. Val Tatu
    12. Joe Tedesco
    13. Dave Walker

This meeting was intended to be the final working group meeting of this revision cycle, and there was no date set for the next meeting.

The meeting was adjourned at 2:48 PM.

At the 3/26/25 Dry Type SC meeting Casey Ballard proposed a motion asking the subcommittee to approve sending C57.12.01 Draft 4 to SA Ballot. The motion was seconded by Mike Iman. This motion was unanimously approved.

D.4.3 Revision for IEEE 259 Chair Dave Stankes

Chair: David Stankes
Vice-Chair: Joseph Tedesco
Secretary: Tim-Felix Mai

WG Meeting Agenda

1. Introductions / Attendance/Determine Quorum
2. Approval of agenda
3. Code of Conduct, Copyright, Essential Patent review
4. Approval IEEE 259 WG Meeting Fall 2024 (St. Louis)
5. PAR Revision Update
6. DRAFT 5 review
    1. TF recommendations
    2. NEW Modifications to and Existing System
9. Meeting Adjournment

The meeting of the IEEE 259 Working Group was held in the Mineral Hall meeting room, and Dave Stankes called the meeting to order at 3:15 PM.

There were 46 people present in the meeting, with 13 members and 33 guests. The Working Group had 21 members; therefore, a quorum was reached, and business could proceed. No guests requested membership.

Dave S. asked for a motion to approve the agenda. Aniruddha Narawane moved to accept the agenda, with Manish Saraf seconding the motion. There was no discussion, and approval of the agenda was unanimous.

Dave S. had distributed the minutes of the last meeting. He asked for a motion to approve the minutes. Solomon Chiang moved to accept the minutes, and Chris Powell seconded the motion. There was no discussion, and approval of both sets of minutes was unanimous.

Dave S. showed the 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.

Old Business:

1. **PAR Extension Update:**

    PAR extension can be done virtually or at the Fall meeting as the Par expires December 2026

    David shared the proposed changes:
    Project Title: Standard Test Procedure for Evaluation of Systems of Insulation for Dry-Type Specialty and General-Purpose Transformers
    (Proposed) Scope: This test procedure is for the thermal evaluation of Electrical Insulation Systems for dry-type transformers with a voltages below 601 V.
    (Proposed) Purpose: The standard describes a way to assign a thermal class to a new electrical insulation system by comparison to a known EIS or by assignment of a thermal

class based on assigned correlation time. The standard will also describe the procedure for modification of an established electrical insulation system.

He recommends that a TF will be formed to finalize and present at Fall Meeting for discussion/vote if not before.

2. Draft 5 review

David S. showed the latest version (Draft 5) to the group and highlighted the key changes.

	Key changes to the IEEE 259 Revision	
1	Incorporation of Electrical Insulation flowchart	Improved understanding and flow of information
2	**5.1 Electrical Insulation system test coil** The electrical insulation system test coil may be [1] an actual or simulated production transformer coil or [2] lab test coils in accordance with IEEE 117 Regardless of the selection, the test coil shall have all expected failure modes included in the design in a testable manner.	Allowable test coils include transformer, coils, or General Purpose Models (GPM's)
3	Allows for both Relative Thermal Index (RTI) or Temperature Index (TI)	Choice is dependent upon requirement of application
4	**5.2.2 Coil design** The test coil shall have all expected failure modes included in the design in a testable manner. **5.2.3 Thermo-mechanical design capability ~~screening test~~** This test is intended to determine the maximum aging temperature sustainable by the test coils.	Include option to screen construction thermal capability to provide an indicator to potential performance.
5	Include method to modify and existing system	Primary and Secondary insulations

3. **TF recommendations**

   TF Volunteers needed to review and propose recommendations for:

   Data Analysis Clause 7

1) Application of results (7.4)
2) Report of results (7.5)

   Modifications to an existing system Clause 8

1) Finalize lists and definitions of Primary and Secondary Insulations
2) Single point description for conducting primary insulation modifications
3) Review rules for interchangeability of materials for PRIMARY insulation from an approved supplier based on comparison chemistry and performance such as measured dielectric strength.
4) Flowchart for modifications to an existing system

Evanne and Roger volunteered to work on clause 7 & 8
Tim-Felix volunteered to work on the flowchart as soon as clause 8 is finalized
Chris Powell and Bob Fyrer offered to assist with TF review

There will be serval interim TF meetings (virtual) before the Fall 2025 meeting. The dates of those meetings have not been set yet. The working group would also meet at the Fall Transformers Committee Meeting in October 2025 in Bonita Springs ,FL.

The meeting was adjourned at 4:12 PM.

ATTENDANCE

Role	Last Name	First Name	Affiliation
Member	Ballard	Robert	DuPont
Member	Chiang	Solomon	The Gund Company
Member	Ghosh	Rob	GE Vernova
Member	Lee	Moonhee	Hammond Power Solutions
Member	Levin	Aleksandr	Weidmann Electrical Technology
Secretary	Mai	Tim-Felix	Siemens Energy
Member	Narawane	Aniruddha	EATON Corporation
Member	Saraf	Manish	Hammond Power Solution
Chair	Stankes	David	3M
Vice Chair	Tedesco	Joseph	Hitachi Energy
Guest	Casallas	Camilo	Trench
Member	Mahajan	Kushal	Sungrow
Guest	Mckinney	Kenneth	UL Solutions
Guest	Peterson	Caroline	Xcel Energy
Guest	Pointer	Klaus	Trench Austria
Member	Powel	Chris	Inmountain Elec.
Guest	Sharp	Michael	Trench Limited
Guest	Sonnenberg	Brain	ITI
Guest	Tatu	Val	Powersmiths
Guest	Espindola	Marco	Hitachi Energy
Guest	De Oliveira	Luiz	Hitachi Energy

Guest	Klein	Ken	Johnson
Guest	Gurnand	Bemjmn	Power Magnetics
Guest	Yuan	Guang	Hitachi Energy
Guest	José	Izquierdo	Siemens Energy
Guest	Nguyen	NamTram	TTElectronics
Guest	Tarango	Erik	Olsun electrics
Guest	Caverly	David	Trench Limited
Guest	Patel	Dipesh	Hyper Solutions
Guest	Amin	Mihir	Eaton
Guest	Jarosz	Patrycja	IEEE SA
Guest	Mosquera	Emerson	JST Power Equipment
Guest	Urbinez	Orlurd	JST Power Equipment
Guest	Tsai	Steve	JST Power Equipment
Guest	Hrune	Miljenko	Hitachi Energy
Guest	Zhang	Hongzhi	Hitachi Energy
Member	Evanne	Wang	DuPont
Member	Fyrer	Bob	EIS
Guest	O'Keefe	Sean	DuPont
Guest	Zhou	Anna	Power
Guest	Dopplmair	Peter	Trench Group
Guest	Wong	Terry	Trench Group
Guest	Hossain	Saif	Trench Group
Guest	Hermann	Florian	Trench Group
Guest	Bhardwaj	Navenn	Trench Group
Guest	Attaguile	Sam	3M

D.4.4 ANSI C57.12.55 Enclosures — Shawn Nunn

The meeting was called to order at 4:45 pm on 3/24/25 by Chair Shawn Nunn.

The chair made opening comments, it was made aware that the meeting would be audio recorded for meeting minutes and asked for any objections.

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

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

After circulation of rosters, there were 17 participants, 14 individuals requested membership, and 3 guests.
Meeting quorum was met because this was the first meeting of the Working Group. Please see the list of attendees at the end of the report.

The Chair reviewed the agenda for the meeting.
Motion by Joe Tedesco to approve the Agenda.

- Motion seconded by Tim Felix
- Unanimous Approved

The PAR approval dates and details was displayed, and the Title and Scope of the document was displayed for review to new guests and members.

New Business:

It was discussed by the Chair why the standard needs updated, and it is the only standard that other IEEE Dry-Type standards reference for enclosure details.

The Chair brought up that in many cases OEM's are using this standard along with UL and NEMA standards when testing and approving their enclosure design.

It was noted and discussed within the group if other standards such as UL and NEMA standards could be referenced in this document and/or alignment between the documents. The Chair took an action item to check on this with standards program coordinator about these possibilities.

The Chair displayed 4 items within the standards that is now covered in other standards and can be removed. These items were discussed briefly and then a Motion was made to remove them from the updated version of the standard.

1. Annex A – Test of Minor Variations of Component Materials in Insulation systems.
2. Annex B – Test of Substitute Varnishes in Insulation Systems.
3. Table 5 – Voltage Class based clearance table. (Keep or remove?)
4. Table 9 – Conformance Tests listed, remove all Electrical tests.

Motion by Casey Ballard to Remove the 4 items shown that are now covered in other standards.

- Motion was seconded by Ken Klien.
- No Discussion
- The chair called for a vote on the motion.
- Unanimous Approved
- Motion Passed.

The Chair went through a brief overview of the Standard for those who was not familiar with it. It was noted that the draft copy of the Standard would be provided to all working group members for review after the meeting.

The Chair brought up that many of the special tools and diagrams for the enclosure security tests are covered in the Pad-mount Standard for C57.12.28 that was recently updated and release in 2023. Colby Lovins was a member of this standard and will be asked for details and/or IEEE representative to use the diagrams and drawings.

Manish Safaf mentioned that we should review enclosure Icing and snow protection, especially for blown snow. This was noted and taken as a action item to see if this and/or other standards cover this.

The Chair asked for volunteers to compare the differences between the enclosure types and conformance requirements in this standard as compared to NEMA 250, UL 50E, and CSA C22.2 No. 94.2-20. Several members volunteered and names will be pulled from the meeting minutes audio recording.

A question was raised at the 3/26/25 SC meeting on whether or not the Title will be changed (it will).

WG will meet at fall 2025 meeting

With no further business, the meeting was adjourned.

Chair: Shawn Nunn
Vice Chair: Rob Ghosh (acting secretary for S25 meeting)
Secretary: Colby Lovins (not present at this meeting)

Working Group C57.12.55 Meeting Attendees – Spring 2025

First Name	Last Name	Affiliation	Guest/Member
Robert	Ballard	DuPont	Member
Bob	Fyrer	EIS	Member
Rob	Ghosh	GE	Vice Chair
Ken	Klein	Johnson	Member
Tim-Felix	Mai	Siemens Energy	Member
Shawn	Nunn	Hitachi Energy	Chair
Eric	Tarongo	OLSUN Electric	Member
Joseph	Tedesco	Hitachi Energy	Member
Steve	Tsai	JST Power Equipment	Guest
William Sean	O'Keefe	Dupont	Guest
David	Stankes	3M	Guest
Val	Tatu	Powersmiths	Member
Nam Tran	Nguyen	TT Electronics	Member
Manish	Saraf	Hammond Power Solutions	Member
Sam	Attaguile	3M	Guest
Emerson	Mosquera	JST Power Equipment	Member
Chris	Powell	Intermountain Electronics	Member

D.4.5 Revision of IEEE C57.94 Chair Ken Klein

This WG did not meet in Denver as the document is currently in ballot. There have been 55 comments received and the comment resolution group will meet and resolve the comments. Recirculation ballot is targeted for May.

D.4.6 Revision of C57.12.59 Through Fault Current Paul Weyandt

The Working Group met in Centennial H Meeting room. The meeting was called to order at 11:00 AM by Chair Paul Weyandt.

- Chair made opening comments.
- WG Roster has been distributed.
- Attendance:
- - 34 total participants
- - 14 Members
- - 20 guests
- - 3 guests requested membership
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- There were 14 out of 31 members present. A quorum was NOT present.
- WG Meeting

1. Welcome and Introductions
2. Attendance Roster Being Circulated
3. Confirmation of a Quorum
4. Approval of Agenda
5. Patent disclosure, Code of Conduct and Copyright
6. Approval of Fall Minutes and Spring Virtual Minutes
7. Old Business:
    - Discussion on timeline for Implementation
8. New Business:
    - Overview of IEEE C57.12.59 current status
    - Status of figures to be updated
    - Discussion on challenges and best practices in updating this guide
9. Next Steps and Action Items
    - Assigning additional updates
    - Setting deadlines and follow-up actions
10. Meeting Adjournment

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- Joseph Tedesco moved to approve the agenda; Ken Klein seconded. Motion passed unanimously
- Chair presented call for patents. No claims presented.

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- Chair presented Copyright and behavior policies.

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- Chair presented options for proceeding as approved previously with minor changes.

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- The Chair had distributed the minutes of the last meeting and the virtual meeting on Feb 18.

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- Discussion to extend the lower impedance limit for type 1 transformer in figure 1. Proposed limit was 1%

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- Other improvements have been suggested by Vijay Tendulkar in our virtual meeting. The chair asked if anybody has additional suggestions? None provided

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- The chair showed the minutes of the last meeting and the virtual meeting on Feb 18. They could not be approved as there was no quorum present

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- Meeting adjourned at 11:25 am MDT.

- A virtual working group meeting will be announced when scheduled (most likely early May). Next in-person meeting will take place at the Transformers Committee Fall 2025 Meeting in Bonita Springs, FL. October 19-23, 2025.

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- Meeting Attendees:

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Name	Affiliation	Participation
Ray, Sheila	US Nuclear Regulatory	Guest
Kwan, Kanden	US Nuclear Regulatory	Guest
Powell, Chris	Intermountain Electronics	Member
Klein, Ken	Johnson	Member
Stankes, David	3M	Guest
Guinand, Benjamin	Power Magnetics	Member
O'Keefe, William	DuPont	Member
Wang, Evanne	DuPont	Member
Fyrer, Bob	EIS	Member
Tarango, Erik	Olsun electric	Guest (R)
Schaffer, Marcus	Meta	Guest
Narawane, Aniruddha	Eaton	Member
Gagnon, Jean	Qualitrol	Guest
Attaguile, Sam	3M	Guest
Komu, Latchaur	Siemens Energy	Guest
Izquerdo, Jose	Siemens Energy	Guest
Hogg, Ryan	Bureau of Reclamation	Member
Mai, Tim-Felix	Siemens Energy	Secretary
Walker, David	MGM Transformer	Vice-Chair
Cruz Valdes, Juan Carlos	Prolec GE	Guest
Weyandt, Paul	Schneider Electric	Chair
Radu, Ion	Hitachi Energy	Guest
Tatu, Val	Powersmiths	Member
Adams, Kayland	Prolec GE	Guest
Tedesco, Joseph	Hitachi Energy	Member
Nguyen, Namtran	TT Electronics	Member
Nun, Shawn	Hitachi Energy	Guest
Tsai, Steve	JST Power Equipment	Guest
Urinez, Orlando	JST Power Equipment	Guest
Amin, Mihir	Eaton	Guest
Mahajan, Kushal	Sungrow	Guest
Patel, Dipeshkumar	Hyper Solutions	Guest (R)
Sandaez, Rodriguez, Jesus	Vativ	Guest (R)
Lapointe, Sylvain	Rugged	Guest

D.4.7 Revision of IEEE C57.12.91 Test Code David Walker
Chair: David Walker
Vice Chair & Acting Secretary: Tim-Felix Mai

The meeting was held in the Mineral Hall A meeting room, and David Walker called the meeting to order at 4:45 PM.

Chair made opening comments.

WG Roster has been distributed.

To save time, introductions were skipped.

Attendance:
- 40 total participants
- 16 Members
- 24 guests

There were 16 out of 27 members present. A quorum was present.

Chair presented call for patents. No claims presented.

Chair presented Copyright and behavior policies.

WG Meeting Agenda:
- Introduction and Attendance
- Approval of Agenda
- Approval of Minutes from Spring 2024
- Call for patents
- Copyright Notice
- Old Business
  - PAR Timeline
  - Review Revision Proposals
    i. Current Tolerance and Current Correction during Load Loss Measurement- Kerwin Stretch and Tim_Felix Mai
    ii. Test Current Levels for Short Circuit Test- Joe Tedesco
- New Business
- Balloting?

- Adjournment

David W. asked for a motion to approve the agenda Mike moved to accept the agenda, with Aniruddha seconding the motion. There was no discussion, and approval of the agenda was unanimous.

The Chair had distributed the minutes of the last meeting. He asked for a motion to approve the minutes. Ken moved to accept the minutes, with Joe seconding the motion. There was no discussion, and approval of the minutes was unanimous.

Old Business:
Current Tolerance and Current Correction during Load Loss Measurement were presented by Tim-Felix

Motion: To adopt the wording from IEC about current correction by Manish
Second: Ken
There was no discussion, and approval of the motion was unanimous.

Motion: The average three phase voltage of the no load measurement should be within 1% tolerance of the rated voltage by Manish
Second: Val
There was no discussion, and approval of the motion was unanimous.

Joe presented a proposal for revise Clause 12.3.1: Symmetrical Current Requirement.

- Proposal wording for C57.12.91 Clause 12.3.1:

- For two-winding transformers, the required value of symmetrical winding current for any test shall be determined from the equations in IEEE Std C57.12.01. The symmetrical current magnitude should not exceed the values listed in IEEE Std C57.12.01.

- NOTE—See IEEE Std C57.12.01 for additional clarifying information on the determination of Zs.

Motion: To amend Clause 12.3.1 as proposed above by Joseph Tedesco
Second: Val
approval of the motion was unanimous.

New Business:
Motion: The change the exponent from 1 to 0.9 for AF by Moonhee
Second: Manish
There was short discussion, if the group already have voted on this. This topic was tabled until more data were presented. Monnhee referenced IEC as they are using the same exponent. So C57.12.91 would harmonize with IEC.
Against: 1
Abstain: 4
In favor: 11
Motion passed

Motion: to approve recommending to the Subcommittee that we go to SA ballot with C57.12.91 Draft 6 by Casey
Second: Anirudha
There was no discussion, approval of the motion was unanimous.

Motion: Motion to create a CRG and to authorize that group to resolve technical and editorial ballot comments without further WG action by Joe
Second Moonhee
There was no discussion, approval of the motion was unanimous.

Volunteers for the CRG: Joe, Manish, Val, Anirudha, Tim-Felix, David, Ken, Mike & Kushal

The meeting was adjourned at 5:32 PM.

At the 3/26/25 Dry Type SC meeting David Walker proposed a motion asking the subcommittee to approve sending C57.12.91 Draft 6 to SA Ballot. The motion was seconded by Mike Iman. This motion was unanimously approved.

Chair: David Walker

Vice-Chair / Secretary: Tim-Felix Mai

ATTENDANCE

	First Name	Last Name	Company/Affiliation	
1	David	Walker	MGM Transformers	Chair
2	Tim-Felix	Mai	Siemens Energy	Vice Chair
3	Caroline	Peterson	Xcel Energy	Guest
4	Ken	Klein	Johnson	Member
5	Manish	Saraf	Hammond Power	Member
6	Aleksander	Levin	Weidmann	Guest
7	Moonhee	Lee	Hammond Power	Member
8	Shawn	Nunn	Hitachi Energy	Member
9	Nihat	Kosedagi	Ermco	Guest
10	Casey	Ballard	Dupont	Member
11	Paul	Weyandt	Schneider Electric	Guest
12	Steve	Tsai	JST Power Equipment	Guest

13	Shnniras	Korbagi	MGM Transformers	Guest
14	Guang	Yuan	Hitachi Energy	Member
15	Jeffrey	Britton	Doble Engineering	Guest
16	Harry	Pepe	Phoenix Tech.-Div. of Doble	Guest
17	Namtran	Nguyen	TT Electronics	Guest
18	Ken	McKenney	UL Solutions	Guest
19	Dave	Stankes	3M	Member
20	Phil	Hopkison	HVolt	Guest
21	Aniruddha	Narawane	Eaton	Member
22	Dipeshkumar	Patel	Hyper Solutions	Guest
23	Mihirkumar	Amin	Eaton	Guest
24	Héctor	Garza	Orto de Mexico	Geust
25	Luiz Fernando	De Oliveira	Hitachi Energy	Guest
26	Chris	Powell	Intermountain Electronics	Member
27	Bob	Fyrer	EIS	Guest
28	William Sean	O'Keefee	DuPont	Guest
29	Brain	Sonnenberg	ITI	Member
30	Orhrel	Urbinez	JST Power	Guest
31	Evanne	Wang	DuPont	Guest
32	Emerson	Mosquera	JST Power	Guest
33	Erik	Tarongo	Olsun electric	Guest
34	Giovanni	Hernandez	Virgina Transformer	Guest
35	Attagulie	Sam	3M	Guest
36	Vijay	Gunja	Powertech	Guest
37	Patrycja	Jarosz	IEEE SA	Guest
38	Ben	Guinand	Power Magnetics	Guest
39	Val	Tatu	Powersmiths	Member

40	Mike	Iman	MGM Transformers	Member

D.4.8 Revision of C57.96 Loading Guide **Aniruddha Narawane**

This WG did not meet as document is currently in ballot. Comment resolution group will meet and resolve the comments.

D.4.9 Revision of C57.16 Air Core Reactors **Arturo Del Rio**

1. The working group for the revision of C57.16 met in the Mineral Hall A room of the Hyatt Regency Hotel on Monday March 24th, at 9:30 AM.

2. 1. Introductions and Call for Patents

- The meeting was called to order at 9:30 AM by the WG Chair Art Del Rio.
- Patent, Copy Rights and Behavior slides were circulated with the Meeting Agenda and there were no issues, comments or questions from the participants.
- The attendance roster was circulated.

2. Verification of Quorum

- There was a total of 17 participants: 6 Members and 11 Guests.
- 6 of the current 12 WG Members were present and quorum to carry out business was met.

3.

4. 3. Present status

- The purpose of the WG meeting in Denver was to present an update on the current status of the Comment Resolution Group.
- PAR expires at the end of 2025
- As reported in previous SC Meeting, total of 76 comments were received from the ballot group
- In addition, 92 editorial comments were submitted off-line to the Chair by a WG member.
- The CRG has completed the resolution for all of the comments and only a few needs further discussion and confirmation
- Dave Caverly presented a selection of ballot comments during this meeting

4. Other actions

- The CRG will follow up with on-line meetings to address open items. Dave Caverly to forward the meeting invitations to the CRG members.
- Existing Ballot Resolution Group formed with the following participants.
  - Dave Caverly, responsible for Annex B and B-1
  - Alexander Gaun, responsible for Annex A
  - Klaus Pointner, responsible for Annex F and Sound parts
  - Mike Sharp, responsible for main body and Annex C
  - Pierre Riffon
  - Caroline Peterson, responsible for Word issues
  - Ulf Radbrandt, responsible for Annex G

- Les Recksiedler
- Sylvain Plante
- Thomas Falkenburger
- William Munn (added on 3/24/2025)

There was no new business or comments, and the meeting was adjourned at 10 am, followed by a CRG hybrid/ on-line meeting in Teams.

Next meeting:
Fall 2025 – HYATT REGENCY COCONUT POINT RESORT BONITA SPRINGS, FLORIDA, USA OCTOBER 19 – 23, 2025

Respectfully submitted,
Chair: Art Del Rio (a.delrio@ieee.org)
Vice chair: Dave Caverly (david.caverly@trench-group.com)
Secretary: Ulf Radbrandt (ulf.radbrandt@ieee.org)

Attendance list and membership status.

Role	First Name	Last Name	Company
Guest	Robert	Allison	Dominion Energy
Guest	Gilles	Bargone	FISO
Vice-Chair	David	Caverly	Trench Limited
Chair	J. Arturo	Del Rio	Siemens Energy
Guest	Peter	Dopplmair	Trench Group
Guest	Benjamin	Guinand	Power Magnetics
Member	Saif	Hossain	Trench Limited
Guest	Patrycja	Jarosz	IEEE
Guest	Lazlo	Kadar	Lazlo and Associates
Guest	Kurt	Kaineder	Trench Austria GmbH
Member	William	Munn	Southern Company Services
Member	Klaus	Pointner	Trench Austria GmbH
Member	Michael	Sharp	Trench Limited
Guest	Stephan	Wirth	Coil Innovation
Guest	Naveen	Bhardwaj	Trench Group
Guest	Evanne	Wang	Dupont
Guest	William	O'Keefe	Dupont

D.4.10 Revision of C57.134 Hottest Spot

Document has been published

D.4.11 Revision of C57.124 Partial Discharge

No report given as WG did not meet.

D.5 Old Business

D.5.1 Status of Dry-Type Transformer Documents

The chair reviewed the status of documents, including two expiring soon with no assigned WG. (C57.12.60 and C57.12.51)

At the SC meeting Evanne Wang volunteered to become WG Chair of C57.12.60.

Casey Ballard suggested that C57.12.51 would be an ideal project for a person who has not been a WG chair. The document had undergone a major revision recently and no great changes are anticipated. Anyone who is interested in becoming WG Chair should contact David Walker.

D.6 New Business

D.6.1 Val Tatu brought up an issue regarding appropriate standards to be applied to Low Voltage Dry Type Transformers. He described that currently C57.12.01 and C57.12.91 are applied to LV even though they are written for Medium Voltage transformers. Stated that this has been the case for many years, but it is something that should be addressed.

A discussion ensued with several comments in support of investigating this subject and suggestions on how this issue may be addressed. Some options may include expanding scope of current 12.01 and 12.91 standards OR creation of new LV standard(s). May also consider addressing the (limited) areas that may not be addressed by current MV documents.

A motion to create a Task Force to review options for bringing Low Voltage transformer testing information into the IEEE Transformer Committee scope of documents was proposed by Val Tatu and seconded by Aniruddha Narawane. There were no objections to this motion and was passed unanimously. A list of volunteers was collected and leadership roles were assigned.

Val Tatu
Ken Klein
Shawn Nunn
Mike Iman
Joseph Tedesco - SECRETARY
Paul Weyandt - CHAIR
Chris Powell
David Walker
Tim-Felix Mai
Casey Ballard
Erik Tarango
Brian Sonnenberg
Sam Attaguile
Dave Stankes
Mihirkumar Amin
Namtran Nguyen

Aniruddha Narawane – VICE CHAIR

This Task Force will meet at Fall 2025 meeting.

D.6.2 C57.12.60 Corrigenda

At the last DTSC meeting in St. Louis Solomon Chiang reviewed a mistake he had found when reviewing the data analysis clause 8.2 in C57.12.60. The mistake included incorrect identification of equation 3. At this meeting the DTSC approved a motion to initiate a Corrigendum to fix this specific issue.

A WG was formed late 2024 to develop the PAR and to create the corrigenda document for balloting purpose after approval of the PAR. Members included Solomon Chiang, Dave Stankes, and Roger Wicks.

PAR for the development of a corrigenda for IEEE C57.12.60 was approved on February 13, 2025 NESCOM meeting. Scope of the PAR is limited to correcting an error to an equation number. Details including Scope, Purpose, and Need are shown below.

5.2.b Scope of proposed changes: This corrigendum corrects an incorrect Equation designation in the last paragraph of Clause 8.2.

5.3 Is the completion of this standard contingent upon the completion of another standard? No
5.4 Purpose: The purpose of this test procedure is to establish a uniform method for the following:
a) Acquiring data used to determine the temperature classification of an insulation system
b) Acquiring data that may be used as a basis for a loading guide, such as IEEE Std C57.96(TM)
c) Modifying an established electrical insulation system
5.5 Need for the Project: This corrigendum is to modify the text in Clause 8.2 of the document to reference correct equation, Equation (4), used to calculate T1.

The Working Group responded to a survey ballot on March 6th approving the corrected C57.12.60 corrigenda document unanimously.

On April 4th Solomon Chiang made a motion for the DTSC to approve sending the C57.12.60 Corrigendum to SA ballot. This motion was seconded by Casey Ballard. On April 4th a C57.12.60 Corrigendum Ballot Request was sent by the DTSC Chair to members of the DTSC requesting a vote for one of the below statements:
1) APPROVE sending the C57.12.60 Corrigendum to SA Ballot
2) DISAPPROVE sending the C57.12.60 Corrigendum to SA Ballot
3) ABSTAIN from sending the C57.12.60 Corrigendum to SA Ballot

On April 21st the Chair confirmed that the motion to approve sending the C57.12.60 Corrigendum to SA Ballot had passed. Results of vote: Members = 31 Approve = 19, Abstain = 1, Disapprove = 0, No reply = 11.

D.6.3 Assignment of Dry-Type SC Vice Chairman

Aniruddha Narawane has volunteered to become DTSC Vice Chairman. Congratulations Aniruddha!

With no further business, the meeting was adjourned at 2:35 PM.

Chairman: David Walker

Vice Chairman: Aniruddha Narawane

Secretary: David Stankes (prepared meeting minutes)

Dry-Type SC Meeting Attendees

First Name	Last Name	Company
Sam	Attaguile	3M
Robert	Ballard	DuPont
Comilo	Casallas	Trench Limited
David	Caverly	Trench Limited
Solomon	Chiang	The Gund Company
Luiz	de Oliveira	Hitachi Energyt
Samuel	Debass	EPRI
J. Arturo	Del Rio	Siemens Energy
Marco	Espindola	Hitachi Energy
Alan	Fujimori	Romagnole
Rob	Ghosh	GE
Brad	Greaves	Weidmann
Benjamin	Guinand	Power Magnetics
Vijay	Gunja	Powertech Labs
Saif	Hossain	Trench Limited
Mohammad	Iman	MGM Transformer Company
Jose	Izqoierdo	Siemens Energy
Patrycja	Jarosz	IEEE
John	John	Virginia Transformer Corp.
Ken	Klein	Johnson Coil
Shriniuas	Kotbagi	Mam x mir
Moonhee	Lee	Hammond Power Solutions
Aleksandr	Levin	Weidmann Electrical Technology
Tim-Felix	Mai	Siemens Energy
Kenneth	McKinney	UL Solutions
Amin	Mihir	Eaton
Jerry	Murphy	Reedy Creek Energy Services
Aniruddha	Narawane	Power Distribution, Inc. (PDI)
Nam Tran	Nguyen	TT Electronics
Shawn	Nunn	Hitachi ABB Power Grids
William Sean	O'Keefe	DuPont
Caroline	Peterson	Xcel Energy
Klaus	Pointner	Trench Austria GmbH

Chris	Powell	Intermountain Electronics
Thomas	Propts	Dominion Energy
Manish	Saraf	Hammond Power Solutions
Michael	Sharp	Trench Limited
Brian	Sonnenberg	Instrument Transformers, LLC
David	Stankes	3M
Erik	Tarango	Olsun Electrics Corporation
Valeriu	Tatu	Powersmiths International
Joseph	Tedesco	Hitachi ABB Power Grids
Ubrnez	Orbwb	JST Power
David	Walker	MGM Transformer Company
Evanne	Wang	Dupont
Paul	Weyandt	Schneider Electric
Terry	Wong	Trench LTD
Guang	Yuan	Hitachi Energy
Anna	Zhou	JST Power