

IEEE/PES Transformers Committee

Spring 2025 Meeting Minutes

**Denver, CO, USA
March 23-27, 2025**

Unapproved

(These minutes are on the agenda to be approved at the next meeting in Spring 2025)

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- 13.0 Meetings Planning SC Minutes & Report – Tammy Behrens
- 14.0 Reports from Technical Subcommittees (decisions made during the week)
- 15.0 Additional Report from the Standards Coordinator – Steve Shull
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- 17.0 Closing Session Adjournment

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NOTE: The Annexes included in these minutes are **unapproved** by the respective subcommittees and are accurate as of the date the Transformers Committee meeting minutes were published. Readers are encouraged to check the Transformers Committee website (www.transformerscommittee.org) for the latest revision of the unapproved and the minutes of the next Transformers Committee meeting for final revisions prior to approval.

- Annex A. Bushings SC – Scott Digby
- Annex B. Dielectric Tests SC – Poorvi Patel
- Annex C. Distribution Transformers SC – Jerry Murphy
- Annex D. Dry Type Transformers SC – David Walker
- Annex E. HVDC Converter Transformers & Smoothing Reactors – Klaus Pointner
- Annex F. Instrument Transformers SC – David Wallace
- Annex G. Insulating Fluids SC – Stephanie Mabrey
- Annex H. Insulation Life SC – Sam Sharpless
- Annex I. Meetings SC – Tammy Behrens (see Appendix 9)
- Annex J. Performance Characteristics SC – Sanjib Som
- Annex K. Power Transformers SC – Ryan Musgrove
- Annex L. Standards SC – Dan Sauer
- Annex M. Subsurface Trans & Network Protectors SC – Tony Reis

General Administrative Items

1 AGENDA

Opening Session

Monday, March 24, 2025: 8:00 am - 9:15 am CST (UTC-14:00)

(Attendance recorded by roster – attendance required to maintain Member status)

1. Welcome and Announcements David Wallach
2. Meeting Minute Tammy Behrens
3. Approval of Agenda David Wallach
4. Approval of Minutes from Fall 2024 Meeting David Wallach
5. Chair's Report & Administrative Subcommittee Report David Wallach
6. Vice Chair's Report Bill Griesacker
7. Secretary's Report Scott Reed
8. Treasurer's Report Troy Tanaka
9. Standards Report Steve Shull
10. Liaison Representative Reports
 - 10.1. CIGRE Craig Swinderman
 - 10.2. IEC TC Report(s) Christoph Ploetner et al
 - 10.3. Standards Coordinating Committee, SCC4 (Electrical Insulation) Nancy Frost
 - 10.4. ASTM Ed Casserly
 - 10.5. Transactions on Power and Delivery (TPWRD) Editor Liaison Xose Lopez-Fernandez
11. Hot Topics for the Upcoming Week Subcommittee Chairs
12. Unfinished Business David Wallach
 - 12.1 Standards Committee P&P Revision-status update David Wallach
13. New Business & Wrap-up David Wallach

Closing Session

Thursday, March 27, 2025: 11:00 am - 12:00 pm CST (UTC-18:00)

1. Chair's Remarks and Announcements David Wallach
2. Meetings Planning Subcommittee Tammy Behrens
3. Reports from Technical Subcommittees (decisions made during the week)
 - 3.1. Bushings Scott Digby
 - 3.2. Dielectric Tests Poorvi Patel
 - 3.3. Distribution Transformers Jerry Murphy
 - 3.4. Dry Type Transformers David Walker
 - 3.5. Transformers and Reactors for HVDC Applications Klaus Pointner
 - 3.6. Instrument Transformers David Wallace
 - 3.7. Insulating Fluids Stephanie Mabrey

- 3.8. Insulation Life Sam Sharpless
- 3.9. Performance Characteristics Sanjib Som
- 3.10. Power Transformers Ryan Musgrove
- 3.11. Standards Dan Sauer
- 3.12. Subsurface Transformers & Network Protectors Tony Reis
- 4. Additional Report from Standards Coordinator (issues from the week) Steve Shull
- 5. New Business (continued from Monday) and Wrap-up David Wallach

2 ATTENDANCE

2.1 COMMITTEE MEMBER ATTENDANCE

The following table lists all Committee Members who signed the attendance sheet at the opening or closing session meetings. See section 2.2 for a list of non-Committee Members who signed the attendance sheet at these meetings.

Committee Member Attendance:

Last Name	First Name	Company	Monday 3/24/25	Thursday 3/27/25
Alemeida	Nabi	Prolec GE	X	
Ansari	Tauhid	Hitachi Energy	X	
Antosz	Stephen	Stephen Antosz & Associates, Inc	X	
Arteaga	Javier	Hitachi Energy	X	
Avanoma	Onome	MJ Consulting	X	
Ballard	Robert	Dupont	X	X
Bargone	Gilles	FISO Technologies	X	
Bernesjo	Mats	Hitachi Energy	X	
Betancourt	Enrique	Prolec GE	X	
Biggie	Kevin	Weidmann Electrical Technology	X	X
Blaszczyk	Piotr	Specialty Transformer Components	X	
Blaydon	Daniel	Baltimore Gas & Electric	X	
Blew	David	DS Blew Consulting	X	
Boettger	William	Boettger Transformer Consulting LLC	X	X
Boman	Paul	Hartford Steam Boiler	X	
Bradshaw	Jeremiah	Bureau of Reclamation	X	X
Brown	Darren	Howard Industries	X	
Callsen	Thomas	Weldy-Lamont Associates	X	
Castellanos	Juan	Prolec GE	X	X
Caverly	David	Trench Limited	X	X
Cheim	Luiz	Hitachi Energy	X	
Chiang	Solomon	The Gund Company	X	
Colopy	Craig	Retired	X	
Cruz Valdez	Juan Carlos	Prolec-GE	X	X
Dauzat	Thomas	AEP-SWEPCO	X	X

Davis	Eric	Consultant	X	X
Debass	Samson	EPRI	X	
Del Rio	J. Arturo	Siemens Energy Inc.	X	X
Digby	Scott	Duke Energy	X	X
Dulac	Hakim	Advanced Power Technologies	X	X
Elliott	William	AEP-SWEPCO	X	X
Ermakov	Evgenii	Hitachi Energy	X	X
Fausch	Reto	RF Solutions	X	
Ferreira	Marcos	Quanta Technology	X	
Foata	Marc	MR	X	
Forsyth	Bruce	Cargill	X	
Gamboa	Joseph	HJ Family of Companies	X	X
Garcia	Eduardo	Siemens Energy	X	
Gardner	James	Prolec-GE Waukesha	X	X
Gaytan	Carlos	Prolec GE	X	X
Ghosh	Saurabh	GE	X	
Gorzin	Alireza	Black & Veatch	X	X
Griesacker	Bill	W. Griesacker & Associates Inc.	X	X
Gyore	Attila	M&I Materials Ltd	X	X
Hampton	Kenneth	BGE		X
Hayes	Roger	GE Vernova	X	X
Heinzig	Peter	Weidmann Electrical Technology AG	X	X
Hernandez	Ronald	Doble Engineering Co.	X	X
Hogg	Ryan	Bureau of Reclamation	X	X
Hopkins	Traci	H2Scan Corp	X	
Hopkinson	Philip	HVOLT Inc.	X	X
Iman	Mohammad	MGM Transformer Company	X	
Issack	Ramadan	American Electric Power	X	
John	John	Virginia Transformer Corp.	X	X
Jordan	Stephen	TVA	X	X
Kaineder	Kurt	Siemens Oesterreich AG		X
Kennedy	Sheldon	Sheldon P. Kennedy Engineering, PLLC	X	X
King	Gary	Howard Industries	X	X
Kiparizoski	Zan	Howard Industries	X	X
Klaponski	Brian	Carte International Inc.	X	X
Kornowski	Marek	Polycast Int'l	X	
Kulasek	Krzysztof	Delta Star Inc.	X	
Levin EM	Aleksandr	Weidmann Electrical Technology	X	X
Li	Weijun	Braintree Electric Light Department	X	X
Lopez-Fernandez	Xose	Universidade de Vigo	X	
Mabrey	Stephanie	Weidmann	X	X
Mai	Tim-Felix	Siemens	X	X
Malde	Jinesh	M&I Materials Ltd	X	
Mani	Kumar	Duke Energy Inc.	X	X

Matthews	Lee	Howard Industries	X	X
Milojevic	Goran	DV Power	X	
Murphy	Jerry	Reedy Creek Energy Services	X	X
Murray	David	Tennessee Valley Authority	X	X
Musgrove	Ryan	Oklahoma Gas & Electric	X	X
Nambi	Shankar	Bechtel Power Corp	X	X
Narawane	Aniruddha	EATON Corporation	X	
Panesar	Parminder	Virginia Transformer	X	
Parkinson	Dwight	EATON Corporation	X	X
Patel	Poorvi	EPRI	X	
Patel	Sanjay	Smit Transformer Sales, Inc	X	
Payerle	George	Carte International Inc.	X	
Perjanik	Nicholas	AVO Diagnostics Services	X	
Ploetner	Christoph	Siemens Energy	X	X
Pointner	Klaus	Trench Austria GmbH	X	X
Poulin	Bertrand	Hitachi Energy	X	X
Prevost	Thomas	Weidmann Electrical Technologies Inc.	X	
Radu	Ion	Hitachi Energy	X	X
Rave	Martin	ComEd	X	X
Raymond	Timothy	EPRI	X	X
Reed	Scott	MVA	X	X
Reiss	Tony	Custom Materials, Inc	X	X
Robalino	Diego	Megger	X	X
Roman	Zoltan	GE	X	X
Roussell	Marnie	Entergy	X	
Saad	Mickel	Hitachi Energy	X	
Sahin	Hakan	Virginia Transformer Corp.	X	
Sankarakurup	Dinesh	Duke Energy	X	X
Sarkar	Amitabh	Virginia Transformer Corp.	X	X
Sauer	Daniel	EATON Corporation	X	X
Sbravati	Alan	Hitachi Energy	X	X
Schweiger	Ewald	Siemens AG	X	X
Sen	Cihangir John	Duke Energy	X	X
Sewell	Adam	Quality Switch, Inc.	X	
Sewell	Jeremy	Quality Switch, Inc.	X	X
Sharp	Michael	Trench Limited	X	X
Sharpless	Samuel	Rimkus Consulting Group	X	X
Shertukde	Hemchandra	University of Hartford	X	
Shull	Stephen	BBC Electrical Service Inc.	X	X
Sizemore	Thomas	ABB Inc.	X	
Snyder	Steven	Hitachi Energy	X	X
Solano	William	Maschinenfabrik Reinhausen	X	X
Som	Sanjib	Pennsylvania Transformer	X	X
Spitzer	Thomas	City Transformer Service Co.	X	

Stacy	Fabian	Hitachi Energy	X	X
Stank	Markus	MR	X	X
Stankes	David	3M	X	X
Stechschulte	Kyle	American Electric Power	X	X
Sweetser	Charles	OMICRON electronics Corp USA	X	
Swinderman	Craig	Mitsubishi Electric Power Products	X	X
Szczechowski	Janusz	Maschinenfabrik Reinhausen	X	X
Tanaka	Troy	Burns & McDonnell	X	X
Tatu	Val	Powersmiths Internation	X	X
Tedesco	Joseph	Hitachi Energy	X	X
teNyenhuis	Ed	Hitachi Energy	X	X
Thibault	Mike	Pacific Gas & Electric	X	X
Thompson	James	T&R Service Company	X	
Thompson	Ryan	Burns & McDonnell	X	
Tillery	Timothy	Howard Industries	X	X
Tostrud	Mark	Dynamic Ratings, Inc.	X	
Traut	Alan	Howard Industries	X	X
Van Horn	Jeremy	iFD Technologies	X	
Varghese	Ajith	Prolec-GE Waukesha	X	X
Varnell	Jason	Doble Engineering Co.	X	
Vartanian	John	National Grid	X	
Verdell	Joshua	ERMCO	X	X
Vir	Dharam	Prolec-GE Waukesha	X	X
Vyas	Pragnesh	Cleveland Cliffs	X	
Walker	David	MGM Tansformer Company	X	X
Wallace	David	Mississippi State University	X	X
Wallach	David	Duke Energy	X	X
Wang	Evanne	Dupont	X	X
Washburn	Alan	Burns & McDonnell	X	X
Watson	Joe	JD Watson and Associates	X	X
Webb	Bruce	Knoxville Utilities Board	X	X
Weisensee	Matthew	PacifiCorp	X	
Welton	Drew	Intellirent	X	
Williams	Trenton	Advanced Power Technologies	X	
Woods	Deanna	Pennsylvania Transformer	X	
Wright	Jeffrey	Duquesne Light Co.	X	X
Yun	Joshua	Virginia Transformer Corp.	X	
Zarnowski	Michael	Carte International Inc.	X	
Zhao	Peter	Hydro One	X	X
Zibert	Kris	Allgeier, Martin and Associates	X	X
Ziger	Igor	Koncar	X	
Ziomek	Waldemar	PTI Transformers LP	X	

Based upon the above attendance totals:

Quorum was achieved at Monday Opening Session (158/202 =78%).

Quorum was not achieved at Thursday Closing Session (95/202 = 47%).

2.2 GENERAL ATTENDANCE

The attendance of non-Committee Members who signed the attendance sheet is recorded in the QR code generated excel spreadsheet from the Monday and Thursday general meetings. This document is in a separate file to be uploaded with the meeting minutes to the committee web page (www.transformerscommittee.org).

Monday Opening Session

3 APPROVAL OF AGENDA AND PREVIOUS MINUTES – DAVID WALLACH

At 8:00 AM CDT the Chair (David Wallach) called the meeting to order. He welcomed everyone to the in-person meeting.

The Chair reviewed the names and affiliations of the officers of the Committee.

The agenda was reviewed. There were no comments on the agenda so it is approved.

The Fall 2024 minutes were posted. Dan Sauer made a motion to accept the minutes. Jeryy Murphy seconded the motion. The Chair requested any comments or changes. There were no comments made, therefore the Fall 2024 minutes were approved as published.

4 CHAIR’S REPORT – DAVID WALLACH

Chair’s Report and Remarks – Presented at the Monday General Session – Spring 2025

4.1 IEEE PES TECHNICAL COUNCIL

The IEEE Power Energy Society (PES) Technical Council is composed of the Chairs of the PES Technical and Coordinating Committees plus the Chairs of Standing Committees reporting to it. The full organizational structure of the PES can be found on the PES website (<https://www.ieee-pes.org>). The PES Technical Committees report to the Technical Council on matters concerning membership, recognition, technical publications, scope, and the coordination of the Power Energy Society generated standards. The Technical Committees work directly with the IEEE-SA Standards Board and the PES Standards Coordinating Committees for standards relating to their respective technical scopes. For further details on the Statement of Purpose and Scope of Activities for the PES Technical Council please see the following website; www.ieee-pes.org/statement-of-purpose-and-scope-of-activities-for-the-pes-technical-council.

4.1.1 Technical Council Officers & Members

The officers and members of the Technical Council are listed below for reference.

TECHNICAL COUNCIL OFFICERS 2024-2025

Chair.....Diane Watkins

Vice Chair.....Jim McBride

Secretary.....Costas Vournas

Past Chair.....Hong Chen

TECHNICAL COMMITTEES**Chair**

Analytic Methods for Power Systems Committee	Yanfeng Gong
Electric Machinery Committee	W. Gayland Bloethe
Energy Development and Power Generation Committee	Michael Negnevitsky
Energy Storage and Stationary Battery Committee	Jason Wallis
Insulated Conductors Committee	Bert Spear
Nuclear Power Engineering Committee	Robert Konnik
Power System Communications and Cybersecurity Committee	Marc Benou
Power System Dynamic Performance Committee	Zhenyu (Henry) Huang
Power System Instrumentation and Measurements Committee	David Wallace
Power System Operation, Planning and Economics Committee	Francois Bouffard
Power System Relaying and Control Committee	Gene Henneberg
Smart Buildings, Loads and Customer Systems	Yashen Lin
Substations Committee	Matt Bauer
Surge Protective Devices Committee	Steven Hensley
Switchgear Committee	Donnie Swing
Transformers Committee	David Wallach
Transmission and Distribution Committee	Julio Romero Agüero

COORDINATING COMMITTEES**Chair**

Energy Internet Coordinating Committee	Mohammed Shahidehpour
Intelligent Grid and Emerging Technologies Coordinating Comm	Theo Laughner
Marine Systems Coordinating Committee	Dwight Alexander
Renewable Systems Integration Coordinating Committee	Aidan Tuohy

STANDING COMMITTEES

Chair

Awards Committee	Hong Chen
Organization & Procedures Committee	Jim McBride
Power and Energy Education Committee.....	Sukumar Kamalasan
Standards Coordination Committee.....	Todd Irwin
Technical Sessions Committee	Jim McBride
Entity Proposal Management Committee	Hong Chen, Dan Sabin

4.1.2 PES Technical Council Activities

Upcoming Technical Council meetings include the following:

- July 27–31, 2025, Austin, TX – PES GM
- Nov TBD, Location TBD – Joint Technical Council Retreat

4.1.3 Memberplanet

IEEE PES awarded a contract in 2021 to memberplanet for an Association Management System. The IEEE PES is covering the development cost and will cover the cost of the future annual contract for the memberplanet tool (except for pass-through charges for event registration such as credit card transaction fees). memberplanet continues to work on the latest modules. A Task Force of the Technical Council continues to work closely with memberplanet to bring the product to implementation although frustrating delays continue. As of this week's meetings, we again ask activity leaders to continue to use their own mailing lists and meeting rosters.

All activity leaders - please send email bounces (or email updates) to Ed teNyenhuis to accumulate so we can investigate and update the membership database/Listserv.

4.2 TRANSFORMERS COMMITTEE ACTIVITIES

4.2.1 Fall 2024 St. Louis Meeting

Our Fall 2024 Transformer Committee meeting was a success with 628 attendees, which was up from 533 attendees at the prior meeting with 36 spouse/companions in attendance. We covered our bills (net gain \$76.8k).

4.2.2 Committee Schedule

The location and dates of future committee meetings that are currently planned are as follows:

Fall 2025	Bonita Springs, FL	October 19-23, 2025
Spring 2026	Fort Worth, TX	March 22-26, 2026

Check the Committee website (www.transformerscommittee.org) regularly for information on upcoming meetings.

4.2.3 Avoiding PAR Extensions

Working Group Chairs should pay close attention to the progress of their documents and to strive to complete their assignment(s) within the standard 4-year life of the PAR. To do so, WG Chairs should be careful to avoid scope creep and plan to complete the substantial work on the document in about 3 years to allow sufficient time for the balloting and comment resolution processes.

4.2.4 Meeting App

We continue to use the IEEE EventHub App for our meetings.

4.2.5 Officer's Travel for Committee Required Business

There is travel required by the Officers for IEEE PES Technical Committee work. The Officers have discussed and approved that all relevant and reasonable travel costs for extra meetings that Officers are required to attend shall be reimbursable by the Transformers Committee. Below are the scheduled meetings:

Chair: 3 meetings per year

1. JTCM in January for Technical Council meeting
2. General Meeting in July for Technical Council meeting and O&P Committee
3. Technical Council November Retreat (not included since IEEE PES pays for this trip)

Vice-Chair: 1 meeting in 2025

1. 2025 General Meeting in July for Technical Sessions meeting

Secretary: 1 meeting in 2025

1. GM in July for Technical Sessions meeting for training purposes

Typical business expenses will be covered including air, hotel, meals, mileage, parking, taxi/car, baggage fees, tolls, other. The Treasurer will budget accordingly, for 5-6 meetings per year (and include meeting registration fees, as appropriate).

4.2.6 Website Password Usage

The website password is not for public dissemination. It is for use by our meeting attendees (CM, AP, II) and associated work of the Transformers Committee. Access to the protected information on the Committee website is a benefit of attendance and participation. It may be used by meeting attendees and within attendees' immediate workplace, but not beyond that. A new password is implemented immediately after each fall meeting with an announcement made to share the new password during the closing session.

4.2.6 Website Password Usage

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4.2.7 IEEE Copyright Policy

<https://standards.ieee.org/ipr/index.html>

The Transformers Committee has an obligation comply with the IEEE Copyright Policy and thereby respect and protect the rights of copyright holders by preventing the inappropriate use of material protected by copyright laws.

Compliance with the Copyright Policy requires a certain amount of due diligence on the part of activity leaders, but it is not a daunting task. To assist activity leaders, a webinar was presented on October 5, 2020, that discussed the application of the Copyright Policy during Transformer Committee standards development processes. The presentation is available on the Committee website for those interested in further information.

4.2.8 Call for Patents (Essential Patent Claims)

<https://standards.ieee.org/about/sasb/patcom/patc.html>

A call for patents is required at every Working Group (WG) meeting. This is a reminder to all WG leaders to call for patents and record the results in the meeting minutes. Note it is not required to show the patent slides; it is only necessary to call for patents and record the response in the minutes. If there is a claim reported, the WG chair shall include in the minutes the name & affiliation of the individual asserting a patent claim. Here is what each WG Chair should ask at the beginning of each WG meeting. This applies only to WG's after the PAR is approved by the IEEE-SA Standards Board.

“If anyone in this meeting is aware of any patent claims that are potentially essential to implementation of the document under consideration by this WG, that fact should be made known to the WG and recorded in the meeting minutes.”

There should be no discussion of any patent claim identified, only that it be identified and recorded. Even if no patent claims are identified, the minutes are to indicate that the call for patents was made.

If a patent holder or patent applicant is identified, then the WG Chair (or designee) should ask the patent holder or patent applicant of a patent claim that might be or become an Essential Patent Claim to complete and submit a Letter of Assurance in accordance with Clause 6 of the IEEE-SA Standards Board Bylaws.

4.2.9 Letters of Assurance

A Letter of Assurance (LoA) is a document submitted to IEEE-SA by a patent holder which documents the submitter's position with regards to ownership, enforcement, or licensing of an Essential Patent Claim that may be incorporated into a specific IEEE document. Table 1 lists Letters of Assurance that pertain to our committee as of February 25, 2025. This listing can be found at

<https://standards.ieee.org/about/sasb/patcom/patents/> and by opening the list titled “IEEE C37.30.2™ – N42 (XLSX)”. Locate the C57 documents.

Table 1: Letters of Assurance

Std No.	Patent Owner	Contact for License	Patent Serial No. (if indicated)	Letter Date	Licensing Assurance Received	Date record entered or revised (if known)
C57.104	Arizona Public Service Company	John Finn - Director Venture Investment Management, Venture Investments 400 North Fifth Street, Mail Station 8103, Phoenix AZ 85004 tel: +1-602-250-3517 email:	not indicated	12 Apr 2019	yes	16 Apr 2019

Std No.	Patent Owner	Contact for License	Patent Serial No. (if indicated)	Letter Date	Licensing Assurance Received	Date record entered or revised (if known)
		john.finn@pinnaclewest.com URL: www.aps.com				
C57.12.200	Megger Sweden AB	Niclas Wetterstrand, Product Management Rinkebyvagen 19, SE-182 36 Danderyd, Sweden tel: +46-706917125 email: niclas.wetterstrand@megger.com URL: www.megger.com	8,428,895 (US)	25 Sep 2019	yes	30 Sep 2019
C57.127	ABB Technology Ltd.	Bjorn Dahlstrand, ABB AB, Legal Affairs and Compliance/IP SE 72178, Vasteras, Sweden tel: +46-21345166 fax: +46-21181386 email: bjorn.dahlstrand@seabb.com	6,340,890 (US)	31 Aug 2005	yes	6 Sep 2005
C57.127	General Electric Technology GmbH	Frank Landgraff-Executive Counsel, GE Power Legal Department 3200 Wildwood Parkway Atlanta GA 30339 tel: +1-678-844-5494 email: frank.landgraff@ge.com; URL: https://www.ge.com/power	7,286,968B2 (US)	14 Aug 2018	yes	16 Aug 2018
C57.139	Maschinenfabrik Reinhausen GMBH	Stefanie Hofmeister-Counsel, Corporate Legal Services Falkensteinstrasse 8 D-93059 Regensburg, Germany tel: +49-(0)-94140906811 fax: +49-(0)-94140904015 email: patents@reinhausen.com	not indicated	13 Jan 2013	yes	16 Jan 2013
C57.143	Roger Fenton	Roger Fenton, Principal Engineer, Fenton Solutions 677 N. Shasta Way Upland CA 91786 tel: +1-909-767-8408 email: roger.a.fenton@gmail.com	15/371,085 (US)	9 Oct 2018	yes	12 Oct 2018
C57.143	Roger Fenton	Roger Fenton, Principal Engineer, Fenton Solutions 677 N. Shasta Way Upland CA 91786 tel: +1-909-767-8408 email: roger.a.fenton@gmail.com	10,145,830 (US), 10,613,066 (US), 10,690,643 (US)	3 Aug 2022	yes	5 Aug 2022

Std No.	Patent Owner	Contact for License	Patent Serial No. (if indicated)	Letter Date	Licensing Assurance Received	Date record entered or revised (if known)
C57.143	IntellPower Pty Ltd	Oleg Roizman - Principal, Innovations & Digital Transformation, 10 Warina Road, Carnegie, Victoria, Australia, tel: +61-408109782, email: oleg.roizman@intellpower.com, URL:www.linkedin.com/in/oleg-roizman-23051960	10,101,313 B2 (US)	13 Nov 2021	yes	15 Nov 2021
C57.146	Arizona Public Service Company	John Finn - Director Venture Investment Management, Venture Investments 400 North 5th Street, Mail Station 8103, Phoenix AZ 85004 tel: +1-602-250-3517 email: john.finn@pinnaclewest.com URL: www.aps.com	not indicated	23 May 2024	yes	31 May 2024
C57.147 and C57.155	Cooper Power Systems, LLC	Alan Yerges, Engineering - Power Systems Division IP 11131 Adams Road Franksville WI 53126-0100 tel: +1-262-835-2921 fax: +1-262-835-1515 email: alanpyerges@eaton.com	6,398,986 (US) 6,905,638 (US) 7,651,641 (US)	5 Apr 2017	yes; royalty-free	5 Apr 2017
C57.147 and C57.155	Cooper Power Systems, LLC	Alan Yerges, Engineering - Power Systems Division IP 11131 Adams Road Franksville WI 53126-0100 tel: +1-262-835-2921 fax: +1-262-835-1515 email: alanpyerges@eaton.com	PI 9612097-5	5 Apr 2017	NO	5 Apr 2017
C57.162	IntellPower Pty Ltd	Oleg Roizman - Principal, Innovations & Digital Transformation, 10 Warina Road, Carnegie, Victoria, Australia, tel: +61-408109782, email: oleg.roizman@intellpower.com, URL:www.linkedin.com/in/oleg-roizman-23051960	10,101,313 B2 (US)	13 Nov 2021	yes	15 Nov 2021
C57.163	Advanced Power Technologies, LLC	Gary Hoffman - Managing Member 215 State Road 10 Randolph NJ 07869 tel: +1-973-328-3300 x499 fax: +1-973-328-0666 email: grhoffmann@advpowertech.com URL: www.advpowertech.com	20130285671 (US)	5 May 2014	yes	5 May 2014

Std No.	Patent Owner	Contact for License	Patent Serial No. (if indicated)	Letter Date	Licensing Assurance Received	Date record entered or revised (if known)
C57.167	ZTZ Services International	Daniel Berler - CEO, 15371 NE 21st Avenue, Miami FL 33162, tel: +1-612-703-3335, email: berlerdaniel@ztzservices.us, URL: www.ztzservices.us	not indicated	23 Apr 2021	yes	23 Apr 2021
C57.167	Roger Fenton	Roger Fenton, Principal Engineer, Fenton Solutions 677 N. Shasta Way Upland CA 91786 tel: +1-909-767-8408 email: roger.a.fenton@gmail.com	10,145,830 (US), 10,613,066 (US), 10,690,643 (US)	3 Aug 2022	yes	5 Aug 2022

Respectfully submitted,



David Wallach

Chair, IEEE PES Transformers Committee
Rev. 1, March 1, 2025

5 VICE-CHAIR'S REPORT – BILL GRIESACKER

The Vice-Chair's Report was presented at the Monday General Session.

5.1 IEEE PES CALENDAR OF RECENT AND UPCOMING EVENTS

The following are recent and upcoming PES sponsored conferences and committee events. Please check the PES website at www.ieee-pes.org for further details, and additional events.

2025

- IEEE PES Grid Edge Technologies Conference and Exhibition
January 21-23, 2025, San Diego, California
- IEEE PES General Meeting
July 27-31, 2025, Austin, Texas

2026

- Transmission & Distribution Conference and Exhibition
May 4-7, 2026, Chicago, Illinois

- IEEE PES General Meeting
July 19-23, 2026, Montreal, Quebec, Canada

2027

- IEEE PES General Meeting
July 18-23, 2027, San Francisco, California

2028

- Transmission & Distribution Conference and Exhibition
April 24-27, 2028, Atlanta, Georgia
- IEEE PES General Meeting
July 23-27, 2028, Washington, D.C.

5.2 2025 IEEE PES GENERAL MEETING, JULY 27-31, 2025, AUSTIN, TEXAS

5.2.1 Conference Theme

The weblink for the event is [IEEE PES General Meeting 2025](#)

The theme of the conference is *Achieving Deep Decarbonization in the Electric Power System*

5.2.2 Conference Paper Submittals

The paper submission period opened to authors on October 7, 2024 and closed on November 11, 2024. Once received, papers were then be distributed to various Technical Committees for peer review based upon the paper content. There were a total of 16 papers assigned to the Transformers Committee, two of which were transaction papers and were not part of the Transformers Committee review process. 14 papers were reviewed and seven of these were approved. Below is a summary of the papers assigned to the Transformers Committee

Total Submissions 16

Transferred 0

Accepted 7

Rejected 7

The following table lists the accepted conference papers (transaction and conference)

Paper	Title	Type
25PESGM0045	Indepth Control Dynamics Analysis of Asymmetric Wye-Zigzag based Solid State Transformer for Nonlinear Load Operation	Conference paper
25PESGM0177	Corrosive Sulphur and Selector Switch – Is it a Problem?	Conference paper
25PESGM0448	Graph Theory-Based Topology Derivation for Diverter Switches of Vacuum-Type OLTCs	Transaction paper
25PESGM0474	Digital transformation of the hot-air-circulation drying process for distribution-transformer core coil assemblies	Conference paper
25PESGM0509	Limitations and Performance of Pressure Relief Devices in On-Load Tap Changer Compartments Under Arcing Faults	Transaction paper

Paper	Title	Type
25PESGM0558	Methodology for Specifying Required Noise Performance of Preventive Autotransformers	Conference paper
25PESGM0591	Repeated Flashover Test: Main Considerations, Setup and Result Interpretation	Conference paper
25PESGM1006	Characteristics of Multi-parameters caused by the Partial Discharge Defect in the Oil-immersed Power Transformer at Different Operating	Conference paper
25PESGM1387	Identification of Irregular Transformer Impedance Using Smart Meter Data in Distribution Systems	Conference paper

5.2.3 Paper Reviewer Recognition (volunteers)

Reviewers will be assigned as appropriate to papers received for the PES 2025 General Meeting.

Nabi Almeida	Juliano Montanha	Loren Wagenaar
Steve Antosz	Yuri Monteiro Rossini	David Walker
Claude Beauchemin	Emilio Morales	Reigh Walling
Mats Bernesjo	Dan Mulkey	Joe Watson
Enrique Betancourt	Juan Olivares-Galvan	Bruce Webb
Bruno Bosnjak	Prayag Parikh	Drew Welton
Scott Digby	Poorvi Patel	Rene Wind
Roger Dugan	Goran Plisic	Shuzhen Xu
Mark Foata	Ion Radu	Shibao Zhang
Eduardo Garcia	Diego Robalino	Alan Hongzhi Zhang
Ramsis Girgis	Carlos Sarda	Igor Ziger
Alberto Gutierrez	Ewald Schweiger	Waldemar Ziomek
Didier Hamoir	Abe Shahrodi	Didier Hamoir
Roger Hedlund	Sanjib Som	Enrique Betancourt
Zan Kiparizoski	Brad Staley	Sanjib Som
Aleksandr Levin	Shankar Subramany	
Weijun Li	David Sundin	Bruce Webb
Toni Mellin	Dragan Tabakovic	
Robert Middleton	Ed teNyenhuis	Waldemar Ziomek

Respectfully submitted,

Bill Griesacker

Vice-Chair

March 17, 2025

6 SECRETARY’S REPORT – SCOTT REED

The Secretary’s Report was presented at the Monday General Session.

6.1 MEMBERSHIP REVIEW

The Committee welcomes and encourages active participants to become Members of the Committee. Requirements and application forms can be found in the Organization and Procedures (O&P) Manual, accessible on the Committee website. A link to the Membership Application form can be found on the TransformersCommittee.org homepage in [Information](#) | Information | Forms. Subcommittee Chairs are encouraged to recommend new members to work towards membership and to communicate the process of attaining membership through **active participation** and **contribution** at the WG and SC level. New member applications may be submitted to the Committee Secretary’s attention at any time. Applications will be collected for review and approval in batches at each Administrative Subcommittee meeting.

6.1.1 New Committee Member Approvals

At the Fall 2024 Administrative Subcommittee meeting, six new committee member applications were submitted for consideration. The applications were approved. The new members are listed in the following table.

Name	Affiliation	Sponsor #1	Sponsor #2	Wimberly Sponsor #3	Membership Category
Dave Blew	DE Blue Consulting	George Payerle STNP SC 10 years	John Vartanian C57.12.40 2 years	Mark Faulkner C57.12.44 2 years	User
Ryan Hogg	Bureau of Reclamation	Dan Sauer Standards SC 1 year	Thomas Sizemore ITSC 2 years	Sheldon Kennedy C57.32 2 years	User
Ion Radu	Hitachi Energy	Rogério Verdolin Performance Characteristics SC 5 years	Jerry Murphy Distribution SC 5 year	Ryan Musgrove Power SC 5 years	Producer
Tony Reiss	Custom Materials	George Payerle STNP SC 4 years	Roger Wicks C57.100/IEEE 1276 6 years	R Stephen Shull C57.19.02 6 years	Producer
Val Tatu	Powersmiths International	Casey Bqllard Dry Type SC 1.5 years	David Walker C57.12.91 1.5 years	Ken Klein C57.94 1.5 years	Producer
Michael Zarnowski	Carte	George Payerle STNP SC 2.5 years	John Vartanian C57.12.40 2.5 years	Benjamin Garcia C57.12.24 2.5 years	Producer

6.1.2 New Member Applications

Twelve new applications for Committee Membership were received for consideration since the last Administrative Subcommittee meeting. The following table lists the names of the applicants and a summary of their supporting eligibility information.

Name	Affiliation	Sponsor #1	Sponsor #2	Sponsor #3	Membership Category
Nabi Almeida	Prolec GE	George Payerle STNP SC 3 years	John Vartanian C57.12.40 2 years	Will Elliott C57.12.53 3 years	Producer
Onome Avoma	MJ Consulting	Poorvi Patel Dielectric Tests 2 years	Evgenii Ermakov C57.161 2 years	Rogério Verdolin Performance Characteristics SC 2 years	Producer
Jeremiah Bradshaw	Bureau of Reclamation	Ryan Musgrove Power SC 2 years	Alan Sbravati C57.155 3 years	Stephanie Mabrey C57.637 4 years	Consumer
Jose Gamboa	HJ Family of Companies	Jerry Murphy Distribution SC 3 years	Stephen Shull C57.19.02 3 years	Stephen Shull C57.12.34 3 years	Producer
Alireza Gorzin	Black & Veatch	Poorvi Patel Dielectric Tests 2 years	Peter Zhao C57.156 2 years	Ed teNyenhuus C57.104 1 year	Consumer
Traci Hopkins	H2scan Corporation	Stephanie Mabrey IFSC 2 years	Paul Boman C57.146 2 years	Rainer Frotscher C57.139 2 years	Producer
Ramadan Issack	American Electric Power	Jerry Murphy Distribution SC 2 years	Stephen Shull C57.12.34 2 years	Alan Traut C57.12.23 2 years	Consumer
Parminder Panesar	Virginia Transformer	Poorvi Patel Dielectric Tests 2 years	Hakin Sahin C57.125 4 years	Lance Lewand (behalf of Alan Sbravata) C57.155 3 years	Producer
Fernando Miguel Leal Ramirez	Prolec GE	Poorvi Patel Dielectric Tests 7 years	Dan Sauer C57.168 4 years	Thang Hochanh C57.98 4 years	Producer
Jeremy Van Horn	IFD Technologies	Jerry Murphy Distribution SC 10 years	Dan Mulkey C57.12.28-32 8 years	Carlos Gaytan C57.39	Producer

Pragnesh Vyas	Sunbelt Solomon	Sam Sharpless ILSC 3 years	Stephen Shull C57.12.34 3 years	Ajit Varghese C57.12.90 3 years	Producer
Deanna Woods	Pennsylvania Transformer	Stephanie Mabrey IFSC 15 years	Tom Prevost C57.162 7 years	Rainer Frotscher C57.139 3 years	Producer

6.1.3 Association Management System (AMS) Database

The Transformers Committee AMS database of people, as of 12/31/2021, had three general categories of participation in our activities. These were: **Interested Individual**, **Active Participant**, and **Committee Member**. In addition, the Committee Secretary maintains a list of **Past Committee Members**. The AMS 123 system has been disabled and a new system is under development; more information regarding this new system will be provided as it becomes available.

The following comments are based on the AMS 123 system and will be updated once the new system is functional. A new participant will automatically be assigned the role of Interested Individual when they first sign up. It is the responsibility of everyone to keep his/her profile updated (except for the participant status), although the new memberplanet system is presently under development and is not yet accessible. Based on the level of participation, the committee administrative staff will upgrade the participation status to “Active Participant” when appropriate.

The following table contains a count of the participants grouped by the four general categories (CM totals do not include those requesting membership at this meeting or Members to be moved to Past Member Status). Note that since AMS is inactive and the memberplanet membership system is under development, only the Committee Member section of the table has been updated.

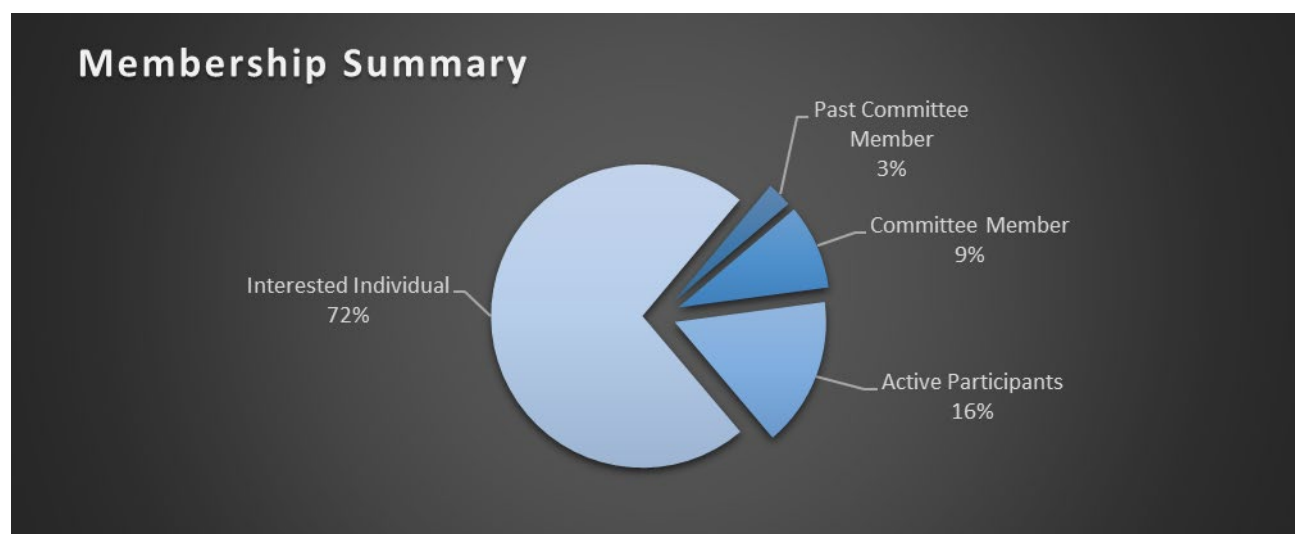
<i>Membership Status</i>	F19	S20	F20	S21	F21*	S22**	F22+	S23+	F23+	S24+	F24+	S25+
<i>Interested Individual</i>	1632	1579	1563	1611	1581	1596	1596	1596	1596	1596	1596	1596
<i>Interested Individual - IEEE Life Member</i>	12	11	12	12	12	12	12	12	12	12	12	12
Total Interested Individuals	1644	1590	1575	1623	1593	1608	1608	1608	1608	1608	1608	1608
<i>Active Participant</i>	362	365	362	360	350	348	348	348	348	348	348	348
<i>Active Participant - IEEE Life Member</i>	7	6	6	6	6	6	6	6	6	6	6	6
Total Active Participants	369	371	368	366	356	354	354	354	354	354	354	354
<i>Committee Member</i>	182	179	179	173	175	173	183	196	203	186	180	188
<i>Committee Member – Emeritus</i>	10	11	11	11	12	12	13	12	12	12	13	14

<i>Membership Status</i>	F19	S20	F20	S21	F21*	S22**	F22+	S23+	F23+	S24+	F24+	S25+
<i>Committee Member - IEEE Life Member</i>	32	33	33	32	33	35	29	22	22	20	19	19
Total Committee Members	192	190	190	184	187	185	196	208	215	198	193	202
<i>Past Committee Member</i>	50	48	48	59	56	53	53	53	53	73	57	60
<i>Past Committee Member - IEEE Life Member</i>	8	12	10	12	12	12	12	12	12	12	12	12
Total Past Committee Members	58	60	58	71	68	65	65	65	65	85	69	72
TOTAL IN AMS DATABASE	2295	2244	2224	2276	2237	2247	2252	2257	2257	2257	2257	2257

* F21 data as of October 3, 2021

**S22 data as of December 31, 2021

+ F22, S23, F23, S24 and F24 - only Committee Member section updated due to inactive AMS and memberplanet system not yet available.



6.2 COMMITTEE, SUBCOMMITTEES, AND WORKING GROUP ROSTERS

In order to provide indemnification to working group and subcommittee members it is crucial that membership lists be maintained. The new memberplanet system, when available, will be most likely be the primary repository for membership records. It is important that each subcommittee and working group chair keep the rosters updated so that this information can be provided to the IEEE SA.

A similar main committee roster has also been developed to track attendance for the Main Committee General Session meeting on Monday & Thursday. The data is used to update participants' membership profile.

6.3 IEEE/PES AND IEEE/SA MEMBERSHIP REQUIREMENTS

As a reminder, all members of the Transformers Committee must also be members in good standing of the Power & Energy Society (IEEE/PES) and the Standards Association (IEEE/SA).

WG Chairs must be members in good standing of the Standards Association (IEEE/SA).

6.4 COMMITTEE MEMBERSHIP MAINTENANCE

The last membership audit was performed in October 2024 prior to the Fall 2024 Transformers Committee Meeting. The next scheduled audit for membership requirements in accordance with the Committee P&P will be in 2026 (IEEE-PES and IEEE-SA). Past Committee Members can be reinstated to Committee Member if their status changes and they are able to regularly participate within two years of being changed to Past Committee Member.

6.5 SENIOR MEMBERSHIP REMINDER

IEEE members are encouraged to apply for senior membership. Senior membership gains recognition by peers/management and better positions for fellow membership. The requirements are 10 years of experience and 3 references.

More details and application can be found at <https://www.ieee.org/membership/senior/> or under the “information tab” of the Transformers Committee website.

6.6 ESSENTIAL PATENT CLAIMS

All registrants were asked to agree with the following statement:

“I have read the Patent Claim notice on the following webpage, and I understand that if I am aware of any Essential Patent Claim related to issues being discussed or considered for inclusion in standards being developed by one or more Working Groups of the Transformers Committee, it is my responsibility to inform the Chair of the Working Group affected by such claim.”

Working Group Chairs are asked to make a call for Essential Patent Claims at the beginning of each meeting and to record the results in the meeting minutes.

6.7 AFFILIATION

According to the IEEE Standards Board Bylaws, there is a requirement that participants of an IEEE meeting disclose their employer and affiliation. Consultants must state if they are sponsored or not. It is not sufficient to simply announce "My name is John Smith, and I'm a consultant." If a consultant is sponsored by a client, it must be disclosed. If the consultant does not have a sponsor, the proper introduction is something such as “My name is John Smith, I am a consultant, and I represent myself at this meeting.”

6.8 MEETING MINUTES

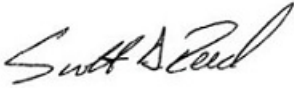
The minutes of the Fall 2024 meeting have been posted to the committee website. Thank you to those who submitted their minutes in a prompt fashion.

Subcommittee Chairs are asked to submit their respective subcommittee meeting minutes for the Spring 2025 meeting held in Denver, CO meeting to the Committee Secretary no later than **May 8, 2025**, which **is 6 weeks** after the completion of the meeting. It is strongly recommended that meeting minutes be prepared at or just after the meeting while the activities are still fresh in members' minds. Doing so will help to ensure the activities and decisions made during the meeting are accurately reflected in the minutes.

Subcommittee meeting minutes should be submitted via e-mail to the Committee Secretary, Scott Reed [sreed@mviagnostics.com], who will forward them on to the webmaster for posting on the Committee website. The submittal file should be saved as a Word document formatted like this document. The minutes shall record the essential business of each SC, WG, and TF meeting including:

- a) Name of group
- b) Date and location of meeting
- c) Officer presiding, including the name of the secretary who wrote the minutes
- d) Meeting participants, including affiliation, and voting member status at the end of the meeting
- e) Call to order, Chair's remarks
- f) Reminders of IEEE policies, such as Patent policy and Copyright policy
- g) The fact that a Call for Patents occurred, and any responses made to such Call
- h) Approval of minutes of previous meeting
- i) Approval of agenda
- j) Technical topics
 - 1) Brief summary of discussion and conclusions
 - 2) Motions exactly as they are stated, including the names of mover and seconder and the outcome of each motion
- k) Action items
- l) Items reported out of executive session
- m) Recesses and time of final adjournment
- n) Next meeting - date, time, and location

Respectfully submitted,



Scott D. Reed
Secretary
IEEE/PES Transformers Committee
February 15, 2025

7 TREASURER'S REPORT – TROY TANAKA

The Treasurer's Report was presented at the Monday General Session.

The Treasurer's Report is included as **Appendix 10**.

8 STANDARDS REPORT – STEVE SHULL

The Standard Report was presented at the Monday General Session.

The semi-annual Standards Report is included as **Appendix 2**.

9 LIAISON REPORTS

9.1 CIGRE – CRAIG SWINDERMAN

Craig Swinderman prepared a presentation which is shown in **Appendix 3**.

9.2 IEC TC REPORTS – CHRISTOPH PLOETNER

Christoph Ploetner provided a presentation on TC activities. His presentation is available in **Appendix 4**.

9.3 STANDARDS COORDINATING COMMITTEE NO. 4 (ELECTRICAL INSULATION) – EVANNE WANG

Evanne Wang presented an update on SCC04. The presentation is available in **Appendix 5**.

9.4 ASTM – ED CASSERLY

Ed Casserly presented an overview of ASTM D27 activities for electrical insulating liquids and gasses. His presentation is available in **Appendix 6**.

9.5 TRANSACTIONS POWER DELIVERY (XOSE LOPEZ-FERNANDEZ)

Xose Lopez-Fernandez prepared an overview of Transaction Power Delivery activities. His presentation is available in **Appendix 7**.

9.6 NEW BUSINESS

9.7 OPENING SESSION ADJOURNMENT

The meeting adjourned at 9:03 AM.

Thursday Closing Session

10 CHAIR'S REMARKS AND ANNOUNCEMENTS

The Chair called the meeting to order at 10:50 AM.

The Agenda was reviewed and approved on Monday.

- Great meeting with positive feedback. A big thank you to Xcel Energy for hosting the meeting in Denver.

11 MEETINGS PLANNING SC MINUTES & REPORT – TAMMY BEHRENS

See **Appendix 9**.

Attendance record of 614 attendees. The Meetings Subcommittee is comprised of the following positions:

- Presentations & Tutorials: Tom Prevost (tprevost@ieee.org)
- Break Sponsor: Ed Smith (edsmith@ieee.org)
- Website: Kris Zibert & Sue McNelly (tc-webmaster@ieee.org)
- Mobile App: David Wallach
- Meeting Schedule: Jerry Murphy (jerry.murphy@ieee.org)
- Memberplanet: Jim McBride
- Photography: George Payerle

-
- Registration Desk, Etc.
Jennifer Quandel, HPN

Upcoming meetings, for latest information see the Transformers Committee web page:

Fall 2025- October 22-26
Bonita Springs, FL USA
Hyatt Regency Coconut Point Resort and Spa

The following considerations are taken into account for future meeting sites: local host, consideration of # of attendees, availability of technical tours and activities, restaurants in walking distance, international airport, and affordable (for the market).

12 REPORTS FROM TECHNICAL SUBCOMMITTEES (DECISIONS MADE DURING THE WEEK)

Reports from each Technical SC were presented. The complete unapproved minutes for each Subcommittee are included in full in the attached Annexes.

13.1 BUSHINGS SCOTT DIGBY

- PC57.19.01 Char. Perf. Dims. – Held its second WG meeting
- PC57.19.04 5kA+ in Bus Duct – Also held its second WG meeting
- P65700-19-03 DC Bushing – Balloting complete and proceeding with submittal to RevCom to move to Publication.
- PC57.19.100 App. Guide – First round of balloting complete and comment resolution ongoing. PAR expires at the end of the year and anticipate being complete by then.
- New Task Force – Bushing Seismic Certification

12.2 DIELECTRIC TESTS POORVI PATEL

- Quorum was reached and business could be conducted
- TF Revision to Low Frequency Tests. Two Motion were passed:
 - Modification to C57.12.90-2021 delete the sub clause 10.5.1 and add identical section to Clause 10.7 and 10.8
 - An error in formula in external clearance section- should be corrected before next revision of C57.12.00 from BIL and not BSL
- C57.161 2nd WG meeting- DFR for Transformers and Reactors
 - The WG chair is looking for DFR cases to be submitted of transformers and reactors filled with mineral or ester fluids. Moisture related or contamination related cases.
 - Please contact Evgenii Ermakov
- C57.160 Guide for the Elec. Measurement of PD in HV Bushing and Instrument Transformers is published
- C57.98 Impulse Guide has passed the ballot with 75% approval and 93 comments
 - Ballot resolution group is being created
 - Please contact Reto Fausch if you want to join the resolution group
- C57.138 Recommended Practice for Routine Tests for Distribution Transformers
 - Is finalizing the document and will initiate the ballot process in fall
- TF DFR for Instrument Transformer had the 1st meeting
 - Next meeting DFR cases and literature study will be discussed.

12.3 DISTRIBUTION TRANSFORMERS JERRY MURPHY

- C57.12.32 - WG Std Submersible Enc Integrity – Dan Mulkey; expires 2029

- WG worked on the revision
- C57.12.34 - WG 3-Phase Padmount Transf – Steve Shull; expires 2032
 - WG worked on the revision
- C57.12.36 - Distribution Substation Transf – Jerry Murphy; expires 2027
 - In ballot closed yesterday. CRG formed and work will continue.
- C57.12.37 - Electronic Reporting of Test Data – Al Traut; expires 2025
 - WG reviewed latest revision and voted to go to ballot
- C57.12.38 – WG 1-Phase Padmount Transf – Ali Ghafourian; expires 2024
 - Approved
- C57.12.39 Tank Pressure Coordination – Carlos Gaytan; expires 2027
 - WG worked on revision
- C57.15 Voltage Regulators – Dan Sauer; expires 2027
 - Joint IEC document will meet Thursday & Friday this week
- C57.15.01 Pad Voltage Regulators – Kyle Heiden
 - New WG
- P3476.5 SCATE Transformer Asset Traceability – Alicia Farag
 - TF Met and New PAR is at NEXCOM for WG to meet in Fall
 - TF Transf Efficiency & Loss Evaluation (DOE Activity) – NEMA Presenter
 - TF Tank Touch Temp – Final report; references being added & formatted

12.4 DRY TYPE TRANSFORMERS DAVID WALKER

- Revision of C57.12.58 Transient Voltage Analysis of Dry-Type Transformer Coil-Ken Klein
 - WG updated first 4.5 Clauses of document
- Revision of C57.12.01 General Requirements-Casey Ballard
 - WG and SC voted to go to ballot. CRG formed.
- Revision of 259 LV Thermal Aging-Dave Stankes
 - Have plan for completing final two sections. Decided to get a PAR revision to add information on modifying an existing system.
- WG ANSI C57.12.55 Enclosures- Shawn Nunn
 - First Revision since 1987. WG met for first meeting and started work
- Revision of C57.94 Install and Operation Guide- In comment Resolution- Ken Klein

- Revision of C57.12.59 Through Fault Current-Paul Weyandt
 - Decided to do only minor updates. Graph for Category 1 transformers updated.
- Revision of C57.12.91 Dry-Type Test Code-David Walker
 - Added method for correcting for a difference between tested and rated currents in load loss test. Similar to IEC standard 60076-1 Clause 11.4. Added tolerance for applied voltage compared to rated voltage in no load loss test. WG and SC voted to go to ballot. CRG formed.
- Revision of C57.96 Dry-Type Loading Guide- In comment Resolution-Mike Iman
- Revision of C57.16 Air Core Reactors- In comment resolution. Need PAR extension-Arturo Del Rio
- Revision of C57.134 Hottest Spot- Published-Colby Lovins
- Revision of C57.124 Partial Discharge Ballot group being formed after MEC changes-Thomas Prevost
- Created Task Force to investigate if and how to include 600V class general purpose transformers into family of dry standards- add to C57.12.01, create new standard, don't do at all?

12.5 TRANSFORMER AND REACTORS FOR HVDC APPLICATIONS KLAUS POINTNER

- New SC Setup
- Appointment of Waldemar Ziomek as Vice Chair
- Appointment of Saif Hossain as Secretary
- Quorum met
- 18 guests and 14 out of 21 members present
- 4 new requests for membership received
- 2 active working groups
 - WG IEC/IEEE 60076-57-129 (Chair: Waldemar Ziomek)
 - WG is moving well, additional JWG meetings on Thursday and Friday this week – members please show up.
 - Entity WG PC57.132 - Guide for vibration testing of oil immersed HVDC converter transformer
 - The WG chair reported, that there was no progress since Fall 2024 meeting – next meeting in April 2025 in CN
 - 3 EPMC PAR proposals presented / discussed
 - One rejected (does not belong to the SC/TC), 1 will be commented back and 1 will be send back to the TC for further decision (not SC HVDC specific)

12.6 INSTRUMENT TRANSFORMERS DAVID WALLACE

- Igor Ziger agreed to take the role of Vice-Chair and Dennis Carr agreed to take the role of Secretary for the Subcommittee.
- The WG to revise C57.13 worked on completing the homework assignments. There are 8 assignments open.
- C57.13.9 – Standard for Power-line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers. PAR extension approved. Continued work on the comment resolution. Will continue to hold online meeting to complete the work before Fall meeting.
- TF to merge C57.13 and C57.13.5 met and continued discussion on the document skeleton for reorganizing the main document.
- WG C57.13.11, “Std. Req. for Low Power Its” met for the first time.
- TF on IT accuracy met to work on VT and CT accuracy clauses. All of the comments on the clauses have been resolved with a few new assignments made. The approved information will be inserted into C57.13.
- Several members of the WG for C57.13.8 found an issue in the release of IEC/IEEE 63253-5713-8. It was voted on and approved for the formation of a taskforce to address the discrepancy. The report from the TF will be sent to IEC for review and comment since this is a dual logo standard.
- The subcommittee approved sending C57.13.10 “Draft Guide for Calibration of Energized Current Transformers for 34.5 kV and Below” to SA for balloting’

12.7 INSULATING FLUIDS STEPHANIE MABREY

- 89 attendees, 36 members and quorum was reached.
- Many discussions on providing data C57.data@IEEE.org
- When providing data, the working group needs to define by adding their WG name to the subject line of email.
- TF-Silver Corrosion
 - Developed a Title Scope and Purpose and voted to apply for a PAR.
- WG C57.130-Factory Temperature Rise Test DGA.
 - Response to request for factory DGA data has been poor, IEEE advised it may not be able to support the data collection.
 - The Document expires 12-25, par until 2026, options were discussed due to lack of alternative liquids data.
 - WG voted to move forward and make changes to the document as is with only mineral oil
- WG C57.139-LTC DGA Data.
 - Presentations were given on the data, and the percentile limits for status 1, 2, 3, and 4 were chosen to reduce false positives in the data.
 - Ongoing work with Triangle use, ect. 10 suggested limit table by type of LTC will be added to the document.
 - On-track for expected completion of draft guide before the Par expiration - 2026
- WG C57.146-Silicone DGA

- In Ballot, close date is April 12th, 2025 if you have not voted, and part of ballot pool please go and vote.
- WG C57.155- DGA for Ester Fluids.
 - New data is welcomed C57data@ieee.org, 35000 online data, 70,000 offline data has been received
 - Statistical analysis has started
 - A 2 year par extension was approved by the sub-committee
- WG C57.166- Consolidation of Insulating Fluids.
 - No meeting, the document in ballot process – comment resolution, 352 comments, 282 have been addressed, Group meets weekly for 1 hours, expect recirculation by end of summer.
- WG C57.637- Reclamation of Insulating Liquids.
 - Voted to extend the PAR by 2 years
 - Ballot resolution group still resolving comments
 - Document is ready for ballot once C57.166 publishes.
- WG C57.104- DGA for Mineral Oil.
 - Showed presentations that including adding monitoring data points to the guide
 - Set up data collection via IEEE
 - Will be holding virtual meeting to continue reviewing guide for necessary changes.

12.8 INSULATION LIFE SAM SHARPLESS

- C57.91 Loading Guide – In final comment resolution, will be published in Fall.
- C57.100 Thermal Test – Published 2022. No active PAR.
- C57.119 Temp Rise Tests – Expires 2028. PAR recently approved by NESCOM.
- C57.154 Hi Temp Guide – Published 2022. No active PAR
- C57.162 Moisture Guide – Resolving final few comments, final ballot imminent.
- C57.165 Temp Measurements – Published 2024, No Active PAR
- C57.169 Max Winding Rise – Published 2023. No Active PAR
- IEEE 1276 Hi Temp Materials Annex B – In balloting, on track for publishing.
- C57.12.90 Clause 11 Temp rise tests – Two items approved for C57.12.90.
- Study group for Cellulose Degradation Tests – PAR submission approved by ILSC.
- Non C57-91 system loading guide – Developing PAR. This will be a new document.
- EPMC proposal 0197 – Technical Report provided for publishing.
- EPMC proposal 0184 – Liaison has been appointed

12.9 PERFORMANCE CHARACTERISTICS SANJIB SOM

- Subcommittee met at 3:00PM on Wednesday, March 26th, 2025. Quorum was established with 74 members present and 112 guests. Final attendance counts will be confirmed after review of attendance data.

- WG IEEE Guide for the Evaluation of the environmental impact & life cycle assessment of Transformers & Shunt Reactors PC57.151
 - After extensive discussion on design criteria, cradle to gate vs. cradle to grave, loading profile impact, etc., it was decided these topics should be discussed and defined in task forces for approval to be included for section 3 of the guide
- TF Audible Sound Revisions to Test Code
 - Discussion on how to specify the Sound level of PAs to limit impact of PA noise on noise of the main transformer. Present practices in defining PA noise requirements from power transformer manufacturers discussed
 - Reviewed outline of proposed text to include procedure to determine sound level of PAs in air such that PA noise when installed inside transformer tank does not impact the overall sound level of the main Transformer by more than 1 dB and the procedure for measuring sound level of PAs in air.
- TF Transformer Data Required for System Studies
 - Two presentations were given on transformer data required for system studies programs. These will be posted on the TX Committee Website on the PCS webpage
 - The TF plans to have a remote meeting in 4-6 weeks to start work on its report
- WG C57.159 – Standard for DPV Transformers
 - Presentation and discussion on transformers connected to inverters and the effects on the transformer design to achieve reliable operation. Focus on Wye secondary avoid grounding the neutral, if possible, to avoid ground loops, and installing a shield between the core and LV winding to prevent core partial discharge and gassing if the neutral is grounded.
 - Discussion if batteries connected to inverters and other new applications of inverters and new inverter types should be included in the Scope or included in an informative annex.
- TF PCS Cont. Rev. to C57.12.90
 - Continued to work on clause 5.1 regarding the determination of cold temperature for resistance measurements. A small group was formed to work on language before the next meeting
 - The location of clause 10.5.1 within the standard was discussed and decided to be handed over to TF Cont. Revision to low frequency tests C57.12.90 – DiTests for discussion
- WG C57.142 Sw Transients Ind by TR/Bkr Interaction
 - Draft 13 has been completed and incorporates all the 306 addressed comments. A response to 2 comments were presented by the chair. Recirculation will begin as soon as CRG approves. TF will be presenting a tutorial on mitigation methods at the fall meeting
- C57.158 Application Guide for Tertiary Winding and Stabilizing Windings

- TF comments on “Further recommendations for transformers without a delta winding” and “Enhanced topics: Loading of Multi-winding Transformers. and Other” added to draft 2 to be circulated for straw ballot before fall meeting
- TF PAR Study Group C57.120 Loss Evaluation Guide
 - Approved title, scope and purpose as well as a motion to move forward with a PAR for revision of the document
 - Requested approval from PCS to create a PAR to revise C57.120 and received
- WG C57.32 Neutral Grounding Devices
 - All work for clauses 4, 5, 6, and 7 is complete. Clause 8 needs a method for calculating impedance of single-phase transformers and/or zigzags
 - An overall draft will be prepared and sent out to the working group before the next meeting for survey.
- WG PC57.32.10 Entity HVDC Neutral Grounding Device Guide
- document was approved by SA
- WG C57.141 Entity Winding Deformation Guide
 - The Draft 7.0 of IEEE PC57.141 - Guide for Detection, Monitoring, and Evaluation of Winding Deformation in Liquid-Immersed Power Transformers, has been completed and the WG has reached a consensus on moving forward to the SA ballot
- New Business
 - Proposed task force for creation of a PAR for IEC/IEEE 60076-16, C57.109, and C57.110
 - EPM – P0161 Recommended Practice for Testing the Impact of Harmonic Distortion on the Transformers of a nominal voltage of 10kV and less
 - Motion passed for subcommittee to accept oversight over this proposal
- TF PCS Cont. Rev. to C57.12.00
 - Section 7.1.2 update to the KVA levels for Table 11 by adding a proposed write-up as informative in the body of text
 - Modification to the notes in Table 17 specifying Class II power transformers

12.10 POWER TRANSFORMERS RYAN MUSGROVE

- WG C57.156 Guide for Tank Rupture Mitigation– quorum achieved, Continuing to work on the document and plan to meet in Florida. PAR expires 12/31/27.
- WG IEEE 638 Class 1E Transformers for Nuclear Power Gen– quorum achieved, draft 3 was reviewed, updating sections 6.4 and 6.5 based on IEEE/IEC 60980-344-2020, will meet in Florida. Par expires 12/31/27.

- WG IEC/IEEE 60076-57-135 Guide for Phase Shifting Transformers and IEC/IEEE 60076-57-1202– quorum achieved in both working groups, presentation made sections needing updated, definitions between guide and standard discussed will be the same in both documents. C37.245 for protective relaying is starting a PAR for revision so all 3 documents will be under revision at the same time. Will meet in Florida.
- WG C57.143 Monitoring Guide– did not meet. Was approved Dec 11 2024 by Standards Board and is under review by an editor in the standards publications department and should be published this year. Will not meet in Florida.
- WG C57.12.10 Std. req for tr – quorum achieved, reviewed and resolved comments from the straw ballot. Will meet in Florida.
- WG C57.140 Guide for Evaluation and Reconditioning of TR – first WG meeting, established membership. There was a problem with the wording of the PAR submitted and approved that did not match what was voted on, corrections will be made to revise the PAR as previously approved. Established task forces to review documents and provide feedback on overlapping areas and suggestions, will meet in Florida.
- WG C57.125 Failure Investigating and Reporting–quorum achieved. Motions were made to move the draft to ballot and approved in the SC and go for a PAR extension to complete their work both approved unanimously. Ballot resolution group was formed with approval to resolve comments. Will meet in Florida.
- WF C57.157 Guide for the Life Test of Switch Contacts– quorum achieved, working to complete draft for review, looking for Synthetic Ester test data to include in the standard. If anyone is interested, contact Adam Sewell or myself ryan.musgrove@ieee.org. Quality Switch, Specialty Transformer Components will work on setting up/performing testing using Synthetic Esters Continue to work on draft, will meet in Florida.
- WG C57.170 Condition Assessment Guide– quorum achieved. Comments have been resolved and are going for recirculation ballot. Keep an eye out next week, plan to be complete and hopefully not need to meet in Florida.
- WG C57.17 Standard Requirements for Arc Furnace Transformers –quorum achieved. Reviewed comments from 1st and 2nd straw ballot. Plan to complete draft 2.0 and send back to WG for review. Will meet in Florida.
- WG C57.93 Installation and Maintenance Guide– quorum achieved. Task forces provided updates, next step is to compile sections into new document. Will meet in Florida.
- Liaison to Entity PAR PC57.93a comments resolved during last ballot, PAR revision was required to change fluid to liquids.
- WG C57.153 Guide for Paralleling Transformers – quorum achieved. Status updates discussed, looking for volunteer to draft a section on paralleling during reverse power flow. Draft guide will be distributed to members and guests for review. Will meet in Florida.
- Entity PAR C57.145 – Digital Twin for Power Equipment (DTPE) – Working on draft, last meeting was Nov 15th, 2024, February meeting did not occur, no updates regarding status.

- Entity PAR PC57.20 for Low Frequency Power Transmission – Working group met March 19th, many suggestions given by our PTCS participants, and a new draft was supposed to be submitted for review but no updates yet.
- Old business
 - IEEE 693 Recommended Practice for Seismic Design of Substations – Substations Standards Committee – Need volunteers, especially users and transformer manufacturers. Contact – Michael Riley – mjriley@bpa.gov
 - Website - <https://cmte.ieee.org/pes-substations/scd0/wgd4/>
 - Next virtual Meeting Thursday April 3rd 9:00-11:00 AM PDT
 - IEEE PES Substations Committee Annual Meeting will be held in New Orleans on May 12-16, 2025. Meeting May 14th 8-noon Central, hybrid meeting, virtual available.
- New Business –
 - 60214-2 Draft Guide for Tap-Changers – Part 2: Application Guide revision due 12/31/2029
 - C57.148 – Standard for Control Cabinets for Power Transformers revision due 12/31/2030
 - It was mentioned 60214-1 IEC document is also up for revision, and the intention is to combine it and C57.131 into a single dual logo document.
 - Task forces will be created for the above to develop PAR study groups and attempts will be made to form the working groups to meet in the Fall 2025 or Spring 2026 as existing working groups complete their work.

12.11 STANDARDS DAN SAUER

- WG C57.12.00 & C57.12.90 approved to move to sponsor ballot
- WG C57.152 in Ballot resolution
- WG C57.133 held their third meeting and also is running a TF on the Reverse Power Flow definition
- TF on IEEE/IEC cross reference has agreed to create two cross-linking documents. They will conduct a survey for more input.

12.12 SUBSURFACE TRANSFORMERS & NETWORK PROTECTORS TONY REISS

- The meeting was called to order at 11:00 yesterday, we had 45 people attending, with 23 members 22 guests, quorum was achieved.
- The chair and sub committee acknowledged George for many years helping to keep the standards on track. Nabi Almeida was also recognized for taking on the Vice Chair/Secretary role
- The chair mentioned that C57.12.57 (Ventilated Dry-Type Network Transformers), came up in Adcom and would be discussed in new business

- Agenda and previous meeting minutes unanimously approved.
- One new SC member: Jared Bates
- 2 attendees requesting membership, one is going to be accepted. 23 members and 25 guests. Quorum achieved.
- C57.12.24 Three-Phase Submersible Transformers working group –
 - Stage: On break. Not meeting on S25
 - Ben Garcia, Chairman; Tom Dauzat, Vice Chair; George Payerle, Secretary Published: 2023
 - WG remarks: Standard recently published and currently has no active PAR. C57.12.52
- C57.12.40 Secondary Network Transformer working group
 - John Vartanian, Chairman; Dan Schwartz, Secretary, Published 2024
 - Stage: Standard recently published but meeting for potential presentations
 - WG Remarks: Standard recently published, and currently has no active PAR. They met, achieved quorum and had a presentation on continuous hydrogen monitoring.
- C57.12.44 Secondary Network Protectors working group –
 - Mark Faulkner, Chairman; Alex Macias, Secretary
 - Stage: Submitted to Revcom – Not Meeting - Document should be published soon
 - WG Remarks: Vice-chair Alex Macias reported that the document has been approved and will be published soon
- C57.167 Guide for Monitoring Distribution Transformers working group –
 - Gary Hoffman, Chairman; Mike Thibault, Secretary
 - Revision due date: N/A – new standard
 - PAR Approval Date: 6/14/2018
 - PAR Expiration Date: 12/31/2022
 - Stage: Published – not meeting WG Remarks: No remarks or comments
- C 57.12.53 Guide for mitigating corrosion on subsurface transformers working group –
 - Will Elliott, Chair; Michael Zarnowski, Vice-chair; Audrey Siebert-Timmer, secretary
 - PAR Approval Date: 2/23/2022
 - PAR Expiration Date: 12/31/2026
 - Stage: In process

- WG Remarks: WG met, had quorum, voted to send Draft#4e to ballot, unanimously approved by WG members and created the CRG. Requested approval from the SC to go for SA Ballot which was granted.

- Old Business:

- Leadership Change – Tony Reiss, Chair; Nabi Almeida, Vice-Chair. Thank you, George, for many years guiding the Subcommittee.

- New Business:

- C57.12.57 SC ventilated dry type network transformers (inactive, withdrawn 2021, no longer endorsed by IEEE)

- During the discussion on if/how to remove it from the STNP SC webpage, a few users were identified in the group. One with active requirements.

- We will send a poll to verify interest on working/activating C57.12.57

- Our SC requests that if any colleague involved in the Dry Type Standard group members have interest in helping on this standard. The poll could be expanded to other interested parties.

13 ADDITIONAL REPORT FROM THE STANDARDS COORDINATOR

This report provides an opportunity to present standard development issues from the week. Please see the Standards Coordinator's report for details. No additional report was offered at the Spring 2025 meeting.

14 NEW BUSINESS

No new business items were brought up.

15 CLOSING SESSION ADJOURNMENT

The meeting was adjourned at approximately 11.45 PM.

OTHER REPORTS NOT PRESENTED AT THE GENERAL SESSION

16 RECOGNITION AND AWARDS REPORT – ED TENYENHUIS

16.1 GENERAL

The Transformers Committed appreciates the efforts and contributions made by its many members who volunteer their time to advance the work performed by the Committee. To that end, the Committee dedicates time at each of its meetings to recognize noteworthy events and contributions made by members and participants.

16.2

MEMORIAL TRIBUTES

The Transformers Committee has learned of the passing of two past members since its last meeting. Each of these individuals played an important part of Committee activities and upholding the high standards expected of the Transformers Committee during the time they participated. More information is available on the Committee's memorial page at (<https://www.transformerscommittee.org/home/memorials/>).

16.2.1 Alvaro Cancino (1952 – 2024)



Alvaro was born and raised in Mexico City. He earned his electrical engineering degree from México Autonomous National University (UNAM), and his Master's Degree from la Salle University. He studied a specialty on Electrical Machines at the National Polytechnic Institute between 1996-1997. He was trained in transformer design at Westinghouse Electric Corporation, on U.S.A. from 1978 to 1980. And he worked for IEM Industries since 1975.

He spent 35 years at the IEM factory, starting as a test engineer, then design engineer, development engineer, design engineering manager and Technology Manager.

He was Senior Member of IEEE and actively participated in the PES transformers committee for many years.

He was coordinator of subcommittee A2 of Transformers of CIGRÉ Mexico Section and actively participate in the working groups for IEC standards. In 2003 he organized the CIGRE transformer colloquium in Mexico and in 2007 he hosted the IEC TC-14 working group meeting in Mexico.

Alvaro was an exceptional engineer and made a lot of contributions to the Mexican electrical industry, working also on the national standardization committees of CFE, ANCE, IEEE and CIGRE.

As a colleague and friend, Alvaro always cared about training new generations of engineers.

Unfortunately, in 2011 he suffered from heart disease that forced him to retire from active work and for the last few years he was under medical care.

Tributes:

Rodrigo Ocón: "Álvaro was a great mentor for me, a valued friend and coworker. I owe much of my development and professional success to him. Rest in peace Engineer Cancino".

Enrique Betancourt: "As a colleague in the Transformers industry, Alvaro was always very well respected because of his involvement in users' forums and standardization activities. My impression is that he knew how to solve complex problems, by approaching them not only from the technical perspective, but also from the human relations side".

Alvaro was remembered at the Tuesday Luncheon by Tom Prevost and Enrique Betancourt.

16.3

EMERITUS MEMBERS

The Emeritus Member classification is a non-voting member classification for past voting members who have made longstanding / notable contributions to the Committee and demonstrated a high level of participation in the past but for extenuating reasons are no longer able to meet the other membership requirements.

The following is a list of the Committee's current Emeritus Members:

- Balma, Peter
- Beauchemin, Claude
- Dudley, Richard
- Fallon, Donald
- Haggerty, Norman
- Hanus, Kenneth
- Lundquist, Thomas
- Patel, Bipin
- Pierce, Linden
- Sim, Jin
- Vaillancourt, Georges
- Wagenaar, Loren
- Yule, Kipp

16.4 NEW COMMITTEE MEMBERS

Applications for voting membership in the Transformers Committee are review and approved by the Administrative Subcommittee.

Successful applicants can demonstrate **active participation** in **at least three Committee activities for at least two years** and are sponsored by at least one Subcommittee Chair (*specific details available at www.transformerscommittee.org*).

The Transformers Committee welcomes the following new Voting Member whose membership application was reviewed and approved by the Administrative Subcommittee at its March 23, 2025 meeting:

<u>Name</u>	<u>Affiliation</u>
Nabi Almeida	Prolec GE
Onome Avanoma	MJ Consulting
Jeremiah Bradshaw	Bureau of Reclamation
Jose Gamboa	HJ Family of Companies
Alireza Gorzin	Black & Veatch

Traci Hopkins	H2scan Corporation
Ramadan Issack	American Electric Power
Parminder Panesar	Virginia Transformer
Fernando Miguel Leal Ramirez	Prolec GE
Jeremy Van Horn	IFD Technologies
Pragnesh Vyas	Sunbelt Solomon
Deanna Woods	Pennsylvania Transformer

16.5 NEW SENIOR MEMBER

The Transformers Committee recognizes Ewald Schweiger and Mats Bernesjo who both were recently elevated to IEEE Senior Members.

16.6 NEW FELLOW MEMBERS

The Transformers Committee is extremely pleased to recognize the below three Transformers Committee members who were each elevated to IEEE Fellow effective January 1, 2025:

- **Peter Zhao** elevated to IEEE Fellow “for contributions to the development of safer, more reliable and explosion-resistant bushing and transformer standards”
- **Craig Colopy** elevated to IEEE Fellow “for contributions to design, development, and application of single-phase 32-step voltage regulators”
- **Ed teNyenhuus** elevated to IEEE Fellow “for technical leadership in transformer design, industry standards, and power transformer services”

IEEE Fellow is a distinction reserved for select IEEE members whose extraordinary accomplishments in any of the IEEE fields of interest are deemed fitting of this prestigious grade elevation. The other IEEE Fellows in the Transformers Committee are Ramsis Girgis, Sheldon Kennedy, Gary Hoffman, Peter Balma, Phil Hopkinson, Jack Harley, Tom Prevost, Bill Bartley, Jim Harlow, Patrick McShane, Linden Pierce and Loren Wagenaar.

16.7 GENERAL SERVICE AWARDS

16.7.1 Certificate of Appreciation – Meeting Host

The Transformers Committee thanks the Xcel Energy for serving as the Host Company for the Spring 2025 meeting. In addition, the Committee thanks Jeff Gragert for his dedicated service as Host for the meeting.

16.8 OUTSTANDING SERVICE AWARDS

The Transformers Committee has been fortunate over the years to have had many people willing to volunteer their time to help advance the Committee’s work. At any given time, there are typically dozens of active working groups and task forces. It is through the dedicated efforts of the many volunteers that participate in these activities that the Committee is able to produce and maintain over 100 very important industry standards and guides.

The Transformers Committee is pleased to present Outstanding Service Awards to **Roger Hayes**.

16.9 PES TECHNICAL COMMITTEE DISTINGUISHED SERVICE AWARD

The PES Technical Committee Awards are an annual set of awards for each technical committee. The Transformers Committee is pleased to present the Distinguished Service Award to Bruce Forsyth for “sustained performance over many years to contribute to the advancement of the committee technology”

16.10 WORKING GROUP AWARDS

The IEEE Standards Association Standards Board (SASB) presents awards to Working Group Chairs upon publication of a new or revised document and offers the Working Group Chair the opportunity to nominate significant contributors for an IEEE SASB Certificate of Appreciation. At this meeting 3 Working Groups were recognized.

16.10.1 IEEE/IEC 63253-5713-8-2024– IEC/IEEE International Standard - Station Service Voltage Transformers (SSVT)

	•	WG Chair:	David Wallace	
	•	WG Vice Chair:	Ross McTaggart	
	•	WG Secretary:	Kenneth Skinger	
	•	Certificates of Appreciation:		
Adnan Rashid		Devki Sharma	Mana Yazdani	Rudolf Ogajanov
Arnaud Martig		Frank Neder	Michael Hardin	Slobodan Misur
Barrett Wimberly		Fred Elliott	Nicholas Kostich	Stacey Kessler
Binzhan Chen		Huan Dinh	Nigel Macdonald	Stephen Oakes
Caroline Peterson		Igor Ziger	Patrick Rock	Steve Snyder
Dennis Carr		Jaroslav Chorzepa	Peter Zhao	Steven Brzoznowski
Dervis Tekin		Jim McBride	Pierre Riffon	Thomas Sizemore
		Jose Antonio Gonzalez	Randy Brannen	Vladimir Khalin
		Ceballos		
		Kiran Vedante	Randy Mullikin	William Solano
		Lee Bigham	Rolando Demes	Zoltan Roman

16.10.2 IEEE C57.107-2024 – IEEE Recommended Practice for Developing Short-Term Overexcitation V/Hz Curves for Transformers Directly Connected to Generators

- WG Chair: Joe Watson
- WG Vice Chair: Ramsis Girgis
- WG Secretary: Drew Welton

- Certificates of Appreciation:

Amitabh Sarkar	Kayland Adams
Bruce Webb	Kiran Vedante
David Murray	Mats Bernesjo

Eduardo Tolcachir
Egon Kirchenmayer
Giovanni Hernandez
Ion Radu
Jose Antonio Gonzalez Ceballos

Nick Jensen
Ryan Hogg
Sanjay Patel
Suleman Khan

16.10.3 I IEEE C57.131-2024 - IEEE Standard Performance Requirements and Test Methods for Tap-Changers

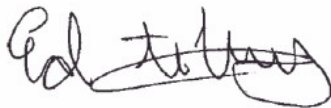
- WG Chair: Craig Colopy
- WG Secretary: Adam Sewell
- WG Vice Chair: Axel Kraemer
- Certificates of Appreciation:

Alan Washburn	Florin Faur	Marcos Ferreira	Thomas Dauzat
Anthony Franchitti	Hugh Waldrop	Markus Stank	Timothy Tillery
Attila Gyore	Hugo Flores	Martin Munoz Molina	William Griesacker
Axel Kraemer	Jennie Aldenlid	Niklas Gustavsson	William Henning
Brian Sparling	Jeremy Sewell	Olivier Lejay	William Whitehead
Christopher Whitten	John Prunte	Peter Kleine	
Dan Schwartz	Juan Carlos Cruz Valdes	Piotr Blaszczyk	
David Calitz	Kristopher Neild	Sanjib Som	
Eric Schleismann	Kyle Stechschulte	Sebastian Rehkopf	
Fabian Stacy	Larry Dix	Stefan Schindler	

16.11 PRESENTATION SLIDES

A brief summary of this Recognition and Awards report was presented at the March 23, 2025 Administrative Subcommittee meeting. A full presentation was made at the Spring 2025 Awards Luncheon on March 25, 2025 in PowerPoint format. The PowerPoint slides are available on the Committee's website at <https://www.transformerscommittee.org/meetings/lastmeetingminutes/>.

Respectfully submitted,



Ed teNyenhuis
Awards Chair and Past Chair
IEEE PES Transformers Committee
Rev. 0 – March 25, 2025

17 ADMINISTRATIVE SUBCOMMITTEE – DAVID WALLACH

The Administrative Subcommittee met on March 23, 2025. The following are the unapproved minutes of that meeting.

17.1 INTRODUCTION OF MEMBERS AND GUESTS

The Chair called the meeting to order and attendees introduced themselves by name, affiliation and role in the Administration Subcommittee. Guests also introduced themselves, by giving their name and affiliation.

Members and Guests Present:

Chair	David Wallach
Vice-Chair	Bill Griesacker
Secretary.....	Scott Reed
Treasurer	Troy Tanaka
Standards Coordinator	Steve Shull
Awards/Past Chair	Ed teNyenhuis
Bushings	Scott Digby
Dielectric Tests	Poorvi Patel
Distribution Transformers	Jerry Murphy
Dry Type Transformers	David Walker
HVDC.....	Klaus Pointner
Instrument Transformers.....	David Wallace
Insulation Life	Sam Sharpless
Insulating Fluids	Stephanie Mabrey
Performance Characteristics	Sanjib Som
Power Transformers	Ryan Musgrove
Standards.....	Dan Sauer
Underground Transformers & Network Protectors	Tony Reis

Guests: Malia Zaman, Patricia Jarosz, David Walker, Vice Chair of Dry Type

17.2 APPROVAL OF PREVIOUS MEETING MINUTES

The Chair requested if there were comments on the draft Fall 2024 Administrative Subcommittee meeting minutes. Stephanie Mabrey made a motion to approve the minutes and Klaus Pointner seconded the motion. Objections to unanimous approval of the minutes was requested. No comments were offered and no objections were voiced, therefore the Fall 2024 Administrative Subcommittee minutes were approved by unanimous consent.

17.3 ADDITIONS TO AND/OR APPROVAL OF THE AGENDA

The preliminary agenda was previously distributed in advance of the meeting. Dan Sauer made a motion to approve the agenda and Sanjib Som seconded the motion. There were no objections to unanimous approval of the agenda, therefore the following agenda was approved

	TOPIC	PRESENTER	EST. START
1.	Administrative Topics (:15)	David Wallach	2:00
	1.1. Introductions and Attendance		
	1.2. Affiliation Change Updates		
	1.3. Review and Approval of the Agenda		
	1.4. Approval of Fall 2024 Minutes		
2.	Officer Reports		2:15
	2.1. Chair's Report (:15).....	David Wallach	
	2.2. Vice Chair's Report (:05)	Bill Griesacker	
	2.3. Secretary's Report & New Committee Membership Approval (:10)	Scott Reed	
	2.4. Treasurer's Report (:05)	Troy Tanaka	
	2.5. Recognition & Awards Report (:05).....	Ed teNyenhuis	
	2.6. Standards Coordinator's Report (:10).....	Steve Shull	
	2.6.1. Standards Report		
	2.6.2. Entity Proposal Report		
3.	IEEE Report		3:05
	3.1. IEEE Staff Update (:10).....	Patrycja Jarosz	
4.	Subcommittee Reports (<i>please limit your report to 4 minutes or less</i>)		3:20
	4.1. Bushings	Scott Digby	
	4.2. Dielectric Test.....	Poorvi Patel	
	4.3. Distribution Transformers	Jerry Murphy	
	4.4. Dry Type Transformers	David Walker	
	4.5. HVDC	Klaus Pointner	
	4.6. Instrument Transformers	David Wallace	
	4.7. Insulating Fluids	Stephanie Mabrey	
	4.8. Insulation Life.....	Sam Sharpless	
	4.9. Performance Characteristics	Sanjib Som	
	4.10. Power Transformers.....	Ryan Musgrove	
	4.11. Standards	Dan Sauer	
	4.12. Subsurface Transformers & Network Protectors	Tony Reiss	
5.	Unfinished Business		4:10
	5.1. Update on memberplanet (:10).....	David Wallach	
	5.2. P&P Revision.....	David Wllach	
	5.3. Other (:05)	All	
6.	New Business (:10).....		4:40
	6.1. CIGRE Trf Database/Open Source Hosting by Trf Committee	David Wallach	
7.	Wrap Up & Adjournment		4:50
	7.1. Wrap Up & Adjournment (:10)	David Wallach	

17.4 CHAIR'S REPORT – DAVID WALLACH

Refer to Section 4.0 of the Main Minutes for a complete "Chair's Report."

17.5

VICE CHAIR’S REPORT – BILL GRIESACKER

Refer to Section 5.0 of the Main Minutes for a complete “Vice Chair’s Report.”

17.6

SECRETARY’S REPORT – SCOTT REED

Refer to Section 6.0 of the Main Minutes for a complete “Secretary’s Report.”

Scott Reed made a motion to approve the following twelve new member applications, and it was seconded by Dan Sauer, with the consideration that any unverified membership requirements were met:

Name	Affiliation
Nabi Alemeida	Prolec GE
Onome Avanoma	MJ Consulting
Jeremiah Bradshaw	Bureau of Reclamation
Joseph Gamboa	HJ Family of Companies
Alireza Gorzin	Black & Veatch
Traci Hopkins	H2Scan Corp
Ramadan Issack	American Electric Power
Parminder Panesar	Virginia Transformer
Fernando Miguel Leal Ramirez	Prolec GE
Jeremy Van Horn	IFD Technologies
Pragnesh Vyas	Sunbelt Solomon
Deanna Woods	Pennsylvania Transformer

The twelve new member applications were approved unanimously without opposition.

17.7

TREASURER’S REPORT – TROY TANAKA

Refer to Section 7.0 of the Main Minutes for a complete “Treasurer’s Report.”

IEEE bank records are not correct as IEEE has changed banking systems again and are aware there are discrepancies. Troy has reported numerous errors to IEEE for missed bank transactions. Troy is tracking separately and reporting all errors to IEEE.

IEEE’s auditors took 6 months to complete the 2023 audit as the internal audit team is new.

17.8

RECOGNITION & AWARDS REPORT – ED TENYENHUIS

Refer to “OTHER REPORTS NOT PRESENTED AT THE GENERAL SESSION” for a complete report presented by the Awards Chair.

17.9

STANDARDS REPORT AND NEW PAR REQUESTS – STEVE SHULL

Refer to Section 8.0 of the Main Minutes for a complete “Standards Report.”

17.10 IEEE STAFF UPDATE – PATRYCJA JOAROSZ

Refer to Appendix 8 of the Main Minutes for the full PowerPoint presentation.

Two Items for Review:

- a. Discussion about the process for entity approval by IEEE. As an example, C57.93a is an entity PAR where one cold start up test is being incorporated into the C57.93 guide. The discussion led to one test case example is not enough scientific evidence to incorporate into a guide. ADCOM is suggesting a questionnaire be developed to screen out worthy topics to determine whether a suggestion should be incorporated to form a PAR or present the idea as a research paper. David Wallach, Poorvi Patel, Steve Shull Sanjib Som, Bill Greisacker, Dan Sauer and Patrycja Jarosz will form a task force to recommend a procedure to IEEE to determine what qualifies as a PAR. The purpose is to develop a screening process to better vet entity PAR ideas.
- b. DGA Collection: IEEE says they can’t anonymize the C57.130 data and suggested collecting the data through survey monkey. Concerns over IEEE’s approach include:

1. Why can’t IEEE anonymize the serial number before turning it over to the WG to review the data?
2. If using Survey Monkey, who has access to the data to make it anonymous?
3. Need to confirm that all Working Group members will have access to the DGA data.

17.11 MEETING PLANNING REPORT – TAMMY BEHRENS (DID NOT PRESENT)

Refer to Appendix 9 of the main Committee minutes for the full Meeting Planning Subcommittee report.

Brief updates on current activities were given by each subcommittee chair; detailed updates are documented in the minutes of each subcommittee.

- 17.11.1** Bushings Subcommittee | Scott Digby
Focus on submitting SC report on time.
- 17.11.2** Dielectric Test Subcommittee | Poorvi Patel
Nothing to report. All is well. 57.98 is in ballot right now.
- 17.11.3** Distribution Transformers Subcommittee | Jerry Murphy
7 (or 8) Working Groups under way. Phil Hopkins runs a forum to share DOE information with attendees (OEMs) that are impacted by the federal government.
- 17.11.4** Dry Type Transformers Subcommittee | David Walker
C57.94. Ballot closed. Comment Resolution Group is actively resolving comments.

C57.96 Ballot closed. Comment Resolution Group is actively resolving comments.

C57.16 PAR extension.

C57.134 Published.

- 17.11.5** HVDC Converter Transformers & Reactors Subcommittee | Klaus Pointner
One active Working Group that is moving along.
Need a new Vice Chair and Secretary
- 17.11.6** Instrument Transformers Subcommittee | David Wallace
WG Requirements for Low Power Instrument Transformers PC57.13.11.
Subcommittee – There are two new topics of discussion that will be held in the meeting
- a. After the release of IEC/IEEE 63253-5713-8, there was an error found in clause 9.6.2.5 section b. The subcommittee will vote on creating a corrigendum for the standard to correct the mistake. This will also involve working with IEC to get their approval as well since this is a joint standard.
- b. A vote will be held to send PC57.13.10 “Draft Guide for Calibration of Energized Current Transformer for 34.5 kV and Below” to SA for balloting.
- 17.11.7** Insulating Fluids Subcommittee | Stephanie Mabrey
Mike Bonn is the new Secretary.
- 17.11.8** Insulation Life Subcommittee | Sam Sharpless
C57.91 will be completed by the next meeting.
Started a new Task Force for loading systems not covered in C57.91. Tim Raymond is the lead.
- 17.11.9** Performance Characteristics Subcommittee | Sanjib Som
All is well.
- 17.11.10** Power Transformers Subcommittee | Ryan Musgrove
WG meetings this week
QR Code works great. Suggests everyone use it.
- 17.11.11** Standards Subcommittee | Dan Sauer
WG C57.133 has an avid interest in the guide revision.
Looking to close 12.00 and 12.90 to present to the SC this week and go to ballot.
- 17.11.12** Subsurface Transformers & Network Protectors Subcommittee | Tony Reiss
Six WG, but three went ballot.
Appointed a Vice Chair.
C57.12.53 has a PAR expiring next year

17.12 UNFINISHED BUSINESS

17.12.1 Memberplanet: Memberplanet is not ready. The hierarchy was above the IEEE TC is under review by IEEE IT group.

17.12.2 P&P Revision: This will be voted for approval at the General Session meeting.

17.12.3 CIGRE Trf Database/Open Source Hosting by Trf Committee: It was decided to revisit this request after we learn more information from CIGRE so we can better understand the value the IEEE TC. IEEE reached out to CIGRE for more information but has not received a reply. No reply has been provided by CIGRE yet.

17.13 NEW BUSINESS

17.13.1

Proposal – Transformer Technology Subcommittee

Proposal is to consider emerging technologies that may approach the Transformers Committee for standard development. **The** IEEE PES Switchgear created a Subcommittee in 2018 that has two task forces. Their switchgear emerging technology subcommittee does not have the authority to write standards.

Example topics that we have discussed in the Transformers Committee that could fall under such a subcommittee to recommend how the Transformers Committee might address:

Solid State Transformers

Flux Gate Based Loss Measurement

Questions: Who would participate in the Subcommittee? When would the Subcommittee be held?

It was stated that ADCOM is technically the overseeing body to decide whether transformer proposals should be considered, and if so, which Subcommittee should oversee it.

It was decided not to create a new non standards-forming Subcommittee at this time but perhaps create Task Forces as needed in the future to evaluate new individual ideas. ADCOM will continue to review new proposals.

17.13.2 Other:

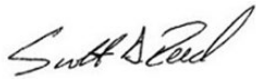
Working Group and Entity P&P's revisions will begin soon

17.14 ADJOURNMENT

The items on the agenda were completed and the meeting was adjourned at 5:00 PM.

Respectfully submitted by:

Scott Reed,



Secretary, Transformers Committee

March 23, 2025

March 23, 2025 Adcom Meeting Attendance:

Last Name	First Name	Affiliation	Meeting Date 03/23/2025
Digby	Scott	Duke Energy	X
Griesacker	Bill	William Griesacker and Associates Inc.	X
Jarosz	Patrycja	IEEE	X
Mabrey	Stephanie	AVO	X
Murphy	Jerry	Reedy Creek Energy Services	X
Musgrove	Ryan	Oklahoma Gas & Electric	X
Patel	Poorvi	EPRI	X
Pointner	Klaus	Trench America	X
Reed	Scott	MVA	X
Reiss	Tony	Custom Materials, Inc	x
Sauer	Daniel	EATON Corporation	X
Sharpless	Sam	Rimkus Engineering	X
Shull	Stephen	BBC Electrical Services, Inc.	X
Som	Sanjib	Pennsylvania Transformer	X
Tanaka	Troy	Burns & McDonnell	X
Walker	David	MGM Transformer	X
Wallace	David	Mississippi State University	X
Wallach	David	Duke Energy	X

APPENDIX 1

Meeting Schedule

KEY

Note: A PC projector will be furnished in each meeting room. Arrive early to ensure equipment operates/syncs correctly.

> = activity continued into another session / from another session

++ = not a Transformers Committee activity

TBD = To Be Determined

TRACK LEGEND

Admin	Administrative SC	Ins Life	Insulation Life SC
Bush	Bushings SC	Instr TR	Instrument Transformers SC
DiTests	Dielectric Tests SC	Mtgs	Meetings Planning SC
Distr	Distribution Transformers SC	PCS	Performance Characteristics SC
Dry Type	Dry Type Transformers SC	Power	Power Transformers SC
HVDC	HVDC Converter Transfs. and Smoothing Reactors SC	STNP	Submersible Transf. & Network Protectors SC
IF	Insulating Fluids SC	Stds	Standards SC

STATUS LEGEND

N	New
I	In-Progress
NC	Near Completion
B	Ballot Stage
C	Complete
E	Entity

SATURDAY, MARCH 22

No Registration and no Meetings, Technical Tours, or Spouse/Companion Tours Planned

SUNDAY, MARCH 23

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
1:00 PM – 5:30 PM	Meeting Registration				Centennial Foyer (3)
2:00 PM – 5:00 PM	Administrative Subcommittee - Closed meeting, by invitation only	Admin	D. Wallach	–	Mineral Hall A (3)
2:00 PM – 5:30 PM	NEMA Transformers - Closed meetings, by invitation only	++	P. Orr	–	Quartz (3)
6:00 PM – 8:00 PM	Welcome Reception Renew old friendships and form new ones! This reception will be held inside the Centennial Ballroom at the Hyatt, so weather will not be an issue. Bars, plenty of fabulous food and live music will be provided. Please indicate whether you will attend this reception during the meeting registration process. All registered attendees and spouses/companions are welcome to attend.				Centennial A (3)

MONDAY, MARCH 24 Breaks Sponsored by GEORG*

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 5:00 PM	Meeting Registration				Centennial Foyer (3)
7:00 AM – 7:50 AM	Newcomers Orientation - Arrive early, grab breakfast and get a good seat - Newcomers and guests are encouraged to attend		B. Griesacker	–	Mineral Hall DEFG (3)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Centennial A (3)
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Lobby Restaurant (1)
8:00 AM – 9:15 AM	Opening Session - All registered meeting participants are encouraged to attend - See separate document on website for meeting agenda - Attendance required to maintain Committee Member status		D. Wallach	–	Centennial DE (3)
10:30 AM – 2:00 PM	Spouses/Companions Activity: Stir Cooking School - Seasoned chefs will guide guests through a range of culinary techniques - Prepare a gourmet lunch with the group, including braised short ribs and a variety of side dishes - Iced tea and dessert included - See website/flyer for details	Tour			
9:15 AM – 9:30 AM	Break (beverages only): GEORG				Centennial Foyer (3)
9:30 AM – 10:45 AM	TF Transformer Data Required for System Studies	PCS	J. Watson	I	Mineral Hall DEFG (3)
9:30 AM – 10:45 AM	TF PAR Study Group Temp Rise Test beyond NP C57.119	Ins Life	E. Schweiger	I	Mineral Hall BC (3)
9:30 AM – 10:45 AM	WG Guide for Tank Rupture Mitigation C57.156	Power	P. Zhao	I	Centennial G (3)
9:30 AM – 10:45 AM	TF Transf Efficiency & Loss Evaluation (DOE Activity)	Distr	P. Hopkinson	I	Centennial DE (3)
9:30 AM – 10:45 AM	WG Requirements for Instrument Transformers PC57.13	Instr TR	D. Wallace	I	Centennial H (3)
9:30 AM – 10:45 AM	WG Guide DGA in Ester-Immersed Transformers C57.155	IF	A. Sbravati	I	Centennial F (3)
9:30 AM – 10:45 AM	WG Dry Type Air-Core Series-Connected Reactors PC57.16	Dry Type	A. Del Rio	N	Mineral Hall A (3)
10:45 AM – 11:00 AM	Break (beverages only): GEORG				Centennial Foyer (3)
11:00 AM – 12:15 PM	WG Eval Guide Environ Impact of Trans & Reactors PC57.151	PCS	J. Kazmierczak	I	Centennial DE (3)
11:00 AM – 12:15 PM	TF PAR Study Req Low Power Instr Transf	Instr TR	F. Neder	N	Mineral Hall A (3)
11:00 AM – 12:15 PM	WG Class 1E Transf for Nuclear Power Gen Std. 638	Power	C. Swinderman	I	Centennial G (3)
11:00 AM – 12:15 PM	TF Tank Touch Temperatures	Distr	B. Webb	N	Centennial F (3)
11:00 AM – 12:15 PM	TF PAR Study Non-C57.91 Loading Characteristics	Ins Life	T. Raymond	N	Mineral Hall BC (3)
11:00 AM – 12:15 PM	WG 1ph Submersible Transformers PC57.12.23	STNP	A. Traut	I	Centennial H (3)
12:15 PM – 1:30 PM	Standards Development Review Luncheon Everyone is welcome to attend. All SC/WG/TF leaders are highly encouraged to attend. Doors open ~12:00 pm. Come early, get a good seat and start eating. Advance on-line registration required. To listen to the presentation without eating lunch, arrive by 12:30 pm.				Centennial A (3)
1:45 PM – 3:00 PM	TF - Tests Degradation of Cellulose in Liquid Type Transfuse	Ins Life	L. Lewand	I	Centennial DE (3)
1:45 PM – 3:00 PM	WG Dry Type Gen. Requirements C57.12.01	Dry Type	C. Ballard	I	Mineral Hall BC (3)
1:45 PM – 3:00 PM	WG Guide for Phase Shifting Transf C57.135	Power	E. Schweiger	I	Centennial G (3)
1:45 PM – 3:00 PM	TF Audible Sound Revision to Test Code	PCS	R. Girgis	I	Centennial F (3)
1:45 PM – 3:00 PM	TF DFR Test Guide C57.161	DiTests	E. Ermakov	I	Centennial H (3)
1:45 PM – 3:00 PM	TF IEEE-IEC Cross Reference	Stds	A. Washburn	I	Mineral Hall A (3)
3:00 PM – 3:15 PM	Break (beverages and treats): GEORG				Centennial Foyer (3)
3:15 PM – 4:30 PM	WG Test for Eval of Insulation for Dry-Type Transfs P259	Dry Type	D. Stankes	I	Mineral Hall A (3)
3:15 PM – 4:30 PM	WG Std Reqs for Liquid-Immersed Power Trans C57.12.10	Power	S. Digby	N	Centennial F (3)
3:15 PM – 4:30 PM	TF PCS Cont. Revisions to C57.12.00	PCS	T. Ansari	I	Centennial G (3)
3:15 PM – 4:30 PM	WG Bushing Application Guide C57.19.100	Bush	T. Spitzer	I	Mineral Hall BC (3)
3:15 PM – 4:30 PM	WG 3-ph Padmount Dist Transf. C57.12.34	Distr	S. Shull	I	Centennial DE (3)
3:15 PM – 4:30 PM	WG Guide Eval & Recon of Liquid Immerse Transf C57.140	Power	M. Ferreira	I	Centennial H (3)
4:30 PM – 4:45 PM	Break (beverages only): GEORG				Centennial Foyer (3)
4:45 PM – 6:00 PM	TF Core Ground & Winding Insul. Resistance - Perf & Int.	DiTests	D. Robalino	I	Centennial H (3)
4:45 PM – 6:00 PM	TF PAR Study Group Unit Substation Transf (C57.12.55)	Dry Type	S. Nunn	I	Centennial G (3)
4:45 PM – 6:00 PM	WG Failure Investigation & Reporting PC57.125	Power	H. Sahin	I	Centennial F (3)
4:45 PM – 6:00 PM	WG Std Distributed Photo-Voltaic Transf (DPVTs) C57.159	PCS	P. Hopkinson	I	Centennial DE (3)
4:45 PM – 6:00 PM	SC HVDC Converter Transfs & Smoothing Reactors	HVDC	K. Pointner	-	Mineral Hall BC (3)
4:45 PM – 6:00 PM	WG PC57.15 Std Req Terms & Test Code for V Step Regs	Distr	D. Sauer	I	Mineral Hall A (3)

TUESDAY, MARCH 25 Breaks Sponsored by Art Advertising*

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 11:30 AM	Meeting Registration				Centennial Foyer (3)
7:00 AM – 7:50 AM	EL&P Delegation (End-users only please) - Arrive early and grab breakfast		J. Murphy	—	Mineral Hall DEFG (3)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Centennial A (3)
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Lobby Restaurant (1)
9:30 AM – 4:00 PM	Spouses/Companions Tour: Red Rocks & Celestial Seasonings Tea - Start the day with a scenic drive to Red Rocks Amphitheater, followed by lunch at Postino Boulder WineCafe - Afternoon adventure includes an engaging factory tour of Celestial Seasonings Tea (with samples!) - Professional tour guide will provide local "flavor" and share her love for the outdoors, history and the arts with attendees - See website/flyer for details	Tour			
7:00 AM – 8:00 AM	WG Pad-Mounted Step-Voltage Regulators PC57.15.01	Distr	K. Heiden	N	Granite (3)
8:00 AM – 9:15 AM	WG Guide for Life Tests of Switch Contacts C57.157	Power	A. Sewell	I	Mineral Hall A (3)
8:00 AM – 9:15 AM	TF PAR Study Group Guide for TVA Dry-Type Coil C57.12.58	Dry Type	K. Klein	I	Mineral Hall BC (3)
8:00 AM – 9:15 AM	WG Power-Line Carrier Coupling Cap & Volt Transf C57.13.9	Instr TR	Z. Roman	I	Centennial G (3)
8:00 AM – 9:15 AM	WG Guide DGA Applied to Factory Temp Rise Test C57.130	IF	B. Forsyth	I	Centennial F (3)
8:00 AM – 9:15 AM	TF on Revision of Impulse Tests C57.12.00 & C57.12.90	DiTests	S. Plante	I	Centennial DE (3)
8:00 AM – 9:15 AM	WG Encl Int C57.12.28, C57.12.29, C57.12.31, C57.12.32	Distr	D. Mulkey	I	Centennial H (3)
8:00 AM – 9:15 AM	TF PAR Study Loss Eval for Power Trf & Reactors C57.120	PCS	R. Verdolin	N	Mineral Hall DEFG (3)
9:15 AM – 9:30 AM	Break (beverages only): Art Advertising				Centennial Foyer (3)
9:30 AM – 10:45 AM	WG Detection of Acoustic Emissions from PD C57.127	DiTests	D. Gross	I	Mineral Hall A (3)
9:30 AM – 10:45 AM	TF Std Require for Bushings C57.19.01	Bush	S. Zhang	I	Mineral Hall BC (3)
9:30 AM – 10:45 AM	TF Instrument Transf. Accuracy	Instr TR	I. Ziger	I	Centennial H (3)
9:30 AM – 10:45 AM	WG Std ID for Supply Chain & Asset Trace P3476 (SCATE)	Distr	A. Farag	I	Centennial F (3)
9:30 AM – 10:45 AM	TF PCS Cont. Rev. to Test Code C57.12.90	PCS	H. Sahin	I	Centennial G (3)
9:30 AM – 10:00 AM	WG Condition Assessment Guide PC57.170	Power	K. Mani	I	Centennial DE (3)
10:00 AM – 10:45 AM	WG Guide for the Reclamation of Mineral Oil C57.637	IF	S. Mabrey	I	Centennial DE (3)
10:45 AM – 11:00 AM	Break (beverages only): Art Advertising				Centennial Foyer (3)
11:00 AM – 12:15 PM	TF for DFR on Instrument Transformers	DiTests	I. Guner	N	Centennial F (3)
11:00 AM – 12:15 PM	WG Liquid-immersed Sec. Network TRs C57.12.40	STNP	J. Vartanian	I	Mineral Hall BC (3)
11:00 AM – 12:15 PM	WG Standard Requirements for Arc Furnace Transf. C57.17	Power	D. Corsi	I	Mineral Hall A (3)
11:00 AM – 12:15 PM	WG Sw Transients Ind by TR/Bkr Interaction PC57.142	PCS	J. McBride	I	Centennial DE (3)
11:00 AM – 12:15 PM	TF Guide for Corrosive Sulfur In Oil-Immersed Trfs & Reactors	IF	L. Lewand	I	Centennial G (3)
11:00 AM – 12:15 PM	WG Through Fault Current PC57.12.59	Dry Type	P. Weyandt	I	Centennial H (3)
12:15 PM – 1:30 PM	Awards Luncheon				Centennial A (3)
All meeting attendees are encouraged to attend to show appreciation and recognize accomplishments. Doors open ~12:00 pm. Come early, get a good seat and start eating. Advance on-line registration is required.					
1:45 PM – 3:00 PM	TF Std Require Bushings above 5kA in Bus Encl. C57.19.04	Bush	S. Digby	I	Mineral Hall A (3)
1:45 PM – 3:00 PM	TF Cont. Revision to Low Frequency Tests C57.12.90	DiTests	A. Varghese	I	Centennial H (3)
1:45 PM – 3:00 PM	WG Liquid Immersed Phase- Shifting Transf 60076-57-1202	Power	E. Schweiger	I	Centennial G (3)
1:45 PM – 3:00 PM	WG DGA in Mineral Oil Transf C57.104	IF	E. teNyenhuus	I	Centennial DE (3)
1:45 PM – 3:00 PM	TF to Merge C57.13.5 into C57.13	Instr TR	Z. Roman	I	Mineral Hall BC (3)
1:45 PM – 3:00 PM	WG Electronic Test Data PC57.12.37	Distr	A. Traut	I	Centennial F (3)
3:00 PM – 3:15 PM	Break (beverages and pretzels): Art Advertising				Centennial Foyer (3)
3:15 PM – 4:30 PM	WG Recommend Practice Routine Impulse Tests C57.138	DiTests	H. Sahin	I	Mineral Hall A (3)
3:15 PM – 4:30 PM	WG Guide for DGA in LTCs C57.139	IF	R. Frotscher	I	Centennial H (3)
3:15 PM – 4:30 PM	WG Guide for Install & Maintenance of Power Trf C57.93	Power	S. Reed	I	Centennial G (3)
3:15 PM – 4:30 PM	TF Continuous Rev Clause 11 Temp Rise Tests C57.12.90	Ins Life	D. Sankarakurup	I	Centennial F (3)
3:15 PM – 4:30 PM	WG Reverse Power Flow Effects on Trans PC57.133	Stds	R. Hogg	I	Centennial DE (3)
3:15 PM – 4:30 PM	WG Guide for Mitigating Corrosion on Sub Trfs C57.12.53	STNP	W. Elliott	I	Mineral Hall BC (3)
4:30 PM – 4:45 PM	Break (beverages only): Art Advertising				Centennial Foyer (3)
4:45 PM – 6:00 PM	WG Guide for App of Tert & Stabilizing Windings C57.158	PCS	E. Betancourt	I	Centennial DE (3)
4:45 PM – 6:00 PM	WG Req for Dist Trf Tank Pressure Coordination C57.12.39	Distr	C. Gaytan	I	Centennial H (3)
4:45 PM – 6:00 PM	WG Guide for Field Testing PC57.152	Stds	M. Ferreira	I	Centennial G (3)
4:45 PM – 6:00 PM	WG Guide for Paralleling Transformers C57.153	Power	M. Tostrud	I	Centennial F (3)
4:45 PM – 6:00 PM	WG Dry Type Test Code C57.12.91	Dry Type	D. Walker	I	Mineral Hall A (3)
4:45 PM – 6:00 PM	WG Neutral Grounding Devices C57.32	PCS	S. Kennedy	I	Mineral Hall BC (3)

WEDNESDAY, MARCH 26 Breaks Sponsored by PROLEC GE*

No Registration and no Technical Tours or Spouse/Companion Events Planned						
TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)	
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Centennial A (3)	
7:00 AM – 8:00 AM	SC Meetings Planning - Arrive early & grab breakfast - All interested individuals welcome	Mtgs	T. Behrens	—	Mineral Hall A (3)	
7:00 AM – 8:00 AM	IEC TC-14 Technical Advisory Group - Breakfast Meeting - arrive early and grab breakfast - All interested individuals welcome		T. Prevost	—	Mineral Hall DEFG (3)	
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Lobby Restaurant (1)	
8:00 AM – 9:15 AM	SC Instrument Transformers	Instr TR	D. Wallace	—	Centennial FG (3)	
8:00 AM – 9:15 AM	SC Insulation Life	Ins Life	S. Sharpless	—	Centennial DE (3)	
9:15 AM – 9:30 AM	Break (beverages only): PROLEC GE				Centennial Foyer (3)	
9:30 AM – 10:45 AM	SC Distribution Transformers	Distr	J. Murphy	—	Centennial DE (3)	
9:30 AM – 10:45 AM	SC Bushings	Bush	S. Digby	—	Centennial FG (3)	
10:45 AM – 11:00 AM	Break (beverages only): PROLEC GE				Centennial Foyer (3)	
11:00 AM – 12:15 PM	SC Submersible Transf. & Network Protectors	STNP	T. Reiss	—	Centennial FG (3)	
11:00 AM – 12:15 PM	SC Dielectric Test	DiTests	P. Patel	—	Centennial DE (3)	
12:15 PM – 1:30 PM	Lunch Break					
12:15 PM – 1:30 PM	Women in Power Luncheon				Silver (3)	
1:30 PM – 2:45 PM	SC Dry Type Transformers	Dry Type	D. Walker	—	Centennial FG (3)	
1:30 PM – 2:45 PM	SC Power Transformers	Power	R. Musgrove	—	Centennial DE (3)	
2:45 PM – 3:00 PM	Break (beverages and treats): PROLEC GE				Centennial Foyer (3)	
3:00 PM – 4:15 PM	SC Insulating Fluids	IF	S. Mabrey	—	Centennial FG (3)	
3:00 PM – 4:15 PM	SC Performance Characteristics	PCS	S. Som	—	Centennial DE (3)	
4:15 PM – 4:30 PM	Break (beverages only): PROLEC GE				Centennial Foyer (3)	
4:30 PM – 5:45 PM	SC Standards	Stds	D. Sauer	—	Centennial DE (3)	
6:00 PM – 10:00 PM	NO DINNER SOCIAL THIS MEETING	Social				

THURSDAY, MARCH 27

No Meeting Registration, Spouse/Companion Tours, or Social Events Planned						
TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)	
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Centennial A (3)	
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Lobby Restaurant (1)	
8:00 AM – 9:15 AM	Technical Presentation 1 Tutorial: Power Transformer Tank Specification for Passive Protection Against Internal Arc and Status of CIGRE TF A2 and IEEE C57.156, presented by Jean-Bernard Dastous, Hydro Quebec; Peter Zhao, Hydro One; Marc Foata, Maschinenfabrik Reinhausen; Ewald Taschler, Siemens Energy	Tutorial			Centennial DE (3)	
9:15 AM – 9:30 AM	Break (beverages only)				Centennial Foyer (3)	
9:30 AM – 10:45 AM	Technical Presentation 2 Tutorial: Optimizing Transformer Cores to Meet DOE 2029. - Presented by Ales Bertuzzi for Georg and Stefan Siebert on behalf of Brockhaus - See flyer on website for details **	Tutorial			Centennial DE (3)	
10:45 AM – 11:00 AM	Break (beverages only)				Centennial Foyer (3)	
11:00 AM – 12:00 PM	Closing Session - All attendees are encouraged to attend - See separate document on website for meeting agenda		D. Wallach		Centennial DE (3)	
12:00 PM	Lunch (on your own)					
12:30 PM – 4:00 PM	Technical Tour: US Bureau of Reclamation Advance registration required—space is limited! Admission confirmed with badge at bus. Board bus at 12:15pm. - Box lunch included. - See website for more information.	Tech Tour				
1:00 PM – 5:00 PM	WG PC57.15 Std Req Terms & Test Code for V Step Regs	Distr	D. Sauer	I	Granite (3)	
1:00 PM – 5:00 PM	WG Rev P60076-57-129 IEC/IEEE Std for HVDC Conv Trfmrs	HVDC	W. Ziomek	N	Mineral A (3)	

* Contact Ed Smith (edsmith@ieee.org) if you are interested in sponsoring a day of coffee breaks at a future meeting.

** Contact Tom Prevost (tprevost@ieee.org) if you are interested in making a technical presentation at a future meeting.

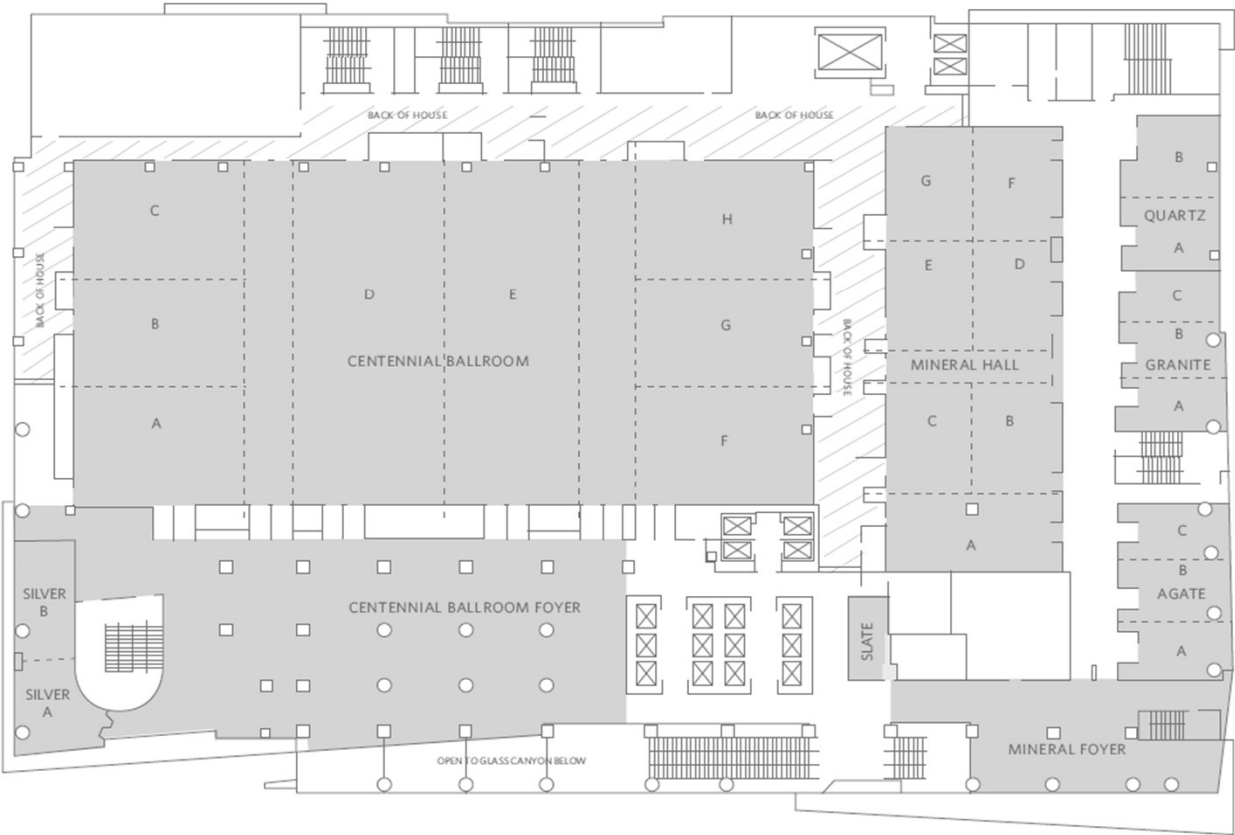
FRIDAY, MARCH 28

No Meeting Registration, Technical Tours, Spouse/Companion Tours, or Social Events Planned					
TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
8:00 AM – 12:00 PM	WG Rev P60076-57-129 IEC/IEEE Std for HVDC Conv Trfms	HVDC	W. Ziomek	N	Mineral DE (3)

FUTURE COMMITTEE MEETINGS

- Fall 2025: Bonita Springs, FL USA, October 19 – 23, 2025
- Spring 2026: Fort Worth, TX USA, March 22 – 26, 2026
- Fall 2026: Fort Lauderdale, FL USA, October 18 – 22 , 2026
- Spring 2027: TBD USA, March , 2026

FLOOR PLAN
Third Floor



SUBCOMMITTEE MEETING LIST

SPRING 2025 MEETING: MARCH 23 TO MARCH 27

Hyatt Regency Denver; Denver, Colorado, USA

Date	Time Start	Time End	Session Title	Track	Chair	Room/Location
3/23/2025	2:00 PM	5:00 PM	Administrative Subcommittee	Admin	D. Wallace	Mineral Hall A (3)
3/24/2025	3:15 PM	4:30 PM	WG Bushing Application Guide C57.19.100	Bush	T. Spitzer	Mineral Hall BC (3)
3/25/2025	9:30 AM	10:45 AM	TF Std Require for Bushings C57.19.01	Bush	S. Zhang	Mineral Hall BC (3)
3/25/2025	1:45 PM	3:00 PM	TF Std Require Bushings above 5kA in Bus Encl. C57.19.04	Bush	S. Digby	Mineral Hall A (3)
3/26/2025	9:30 AM	10:45 AM	SC Bushings	Bush	S. Digby	Centennial FG (3)
3/24/2025	9:30 AM	10:45 AM	TF Transf Efficiency & Loss Evaluation (DOE Activity)	Distr	P. Hopkinson	Centennial DE (3)
3/24/2025	11:00 AM	12:15 PM	TF Tank Touch Temperatures	Distr	B. Webb	Centennial F (3)
3/24/2025	3:15 PM	4:30 PM	WG 3-ph Padmount Dist Transf. C57.12.34	Distr	S. Shull	Centennial DE (3)
3/24/2025	4:45 PM	6:00 PM	WG PC57.15 Std Req Terms & Test Code for V Step Regs	Distr	D. Sauer	Mineral Hall A (3)
3/25/2025	7:00 AM	8:00 AM	WG Pad-Mounted Step-Voltage Regulators PC57.15.01	Distr	K. Heiden	Granite (3)
3/25/2025	8:00 AM	9:15 AM	WG Encl Int C57.12.28, C57.12.29, C57.12.31, C57.12.32	Distr	D. Mulkey	Centennial H (3)
3/25/2025	9:30 AM	10:45 AM	WG Std ID for Supply Chain & Asset Trace P3476 (SCATE)	Distr	A. Farag	Centennial F (3)
3/25/2025	1:45 PM	3:00 PM	WG Electronic Test Data PC57.12.37	Distr	A. Traut	Centennial F (3)
3/25/2025	4:45 PM	6:00 PM	WG Req for Dist Trf Tank Pressure Coordination C57.12.39	Distr	C. Gaytan	Centennial H (3)
3/26/2025	9:30 AM	10:45 AM	SC Distribution Transformers	Distr	J. Murphy	Centennial DE (3)
3/27/2025	1:00 PM	5:00 PM	WG PC57.15 Std Req Terms & Test Code for V Step Regs	Distr	D. Sauer	Granite (3)
3/24/2025	1:45 PM	3:00 PM	TF DFR Test Guide C57.161	DiTests	E. Ermakov	Centennial H (3)
3/24/2025	4:45 PM	6:00 PM	TF Core Ground & Winding Insul. Resistance - Perf & Int.	DiTests	D. Robalino	Centennial H (3)
3/25/2025	8:00 AM	9:15 AM	TF on Revision of Impulse Tests C57.12.00 & C57.12.90	DiTests	S. Plante	Centennial DE (3)
3/25/2025	9:30 AM	10:45 AM	WG Detection of Acoustic Emissions from PD C57.127	DiTests	D. Gross	Mineral Hall A (3)
3/25/2025	11:00 AM	12:15 PM	TF for DFR on Instrument Transformers	DiTests	I. Guner	Centennial F (3)
3/25/2025	1:45 PM	3:00 PM	TF Cont. Revision to Low Frequency Tests C57.12.90	DiTests	A. Varghese	Centennial H (3)
3/25/2025	3:15 PM	4:30 PM	WG Recommend Practice Routine Impulse Tests C57.138	DiTests	H. Sahin	Mineral Hall A (3)
3/26/2025	11:00 AM	12:15 PM	SC Dielectric Test	DiTests	P. Patel	Centennial DE (3)
3/24/2025	9:30 AM	10:45 AM	WG Dry Type Air-Core Series-Connected Reactors PC57.16	Dry Type	A. Del Rio	Mineral Hall A (3)
3/24/2025	1:45 PM	3:00 PM	WG Dry Type Gen. Requirements C57.12.01	Dry Type	C. Ballard	Mineral Hall BC (3)
3/24/2025	3:15 PM	4:30 PM	WG Test for Eval of Insulation for Dry-Type Transfs P259	Dry Type	D. Stankes	Mineral Hall A (3)
3/24/2025	4:45 PM	6:00 PM	TF PAR Study Group Unit Substation Transf (C57.12.55)	Dry Type	S. Nunn	Centennial G (3)
3/25/2025	8:00 AM	9:15 AM	TF PAR Study Group Guide for TVA Dry-Type Coil C57.12.58	Dry Type	K. Klein	Mineral Hall BC (3)
3/25/2025	11:00 AM	12:15 PM	WG Through Fault Current PC57.12.59	Dry Type	P. Weyandt	Centennial H (3)
3/25/2025	4:45 PM	6:00 PM	WG Dry Type Test Code C57.12.91	Dry Type	D. Walker	Mineral Hall A (3)
3/26/2025	1:30 PM	2:45 PM	SC Dry Type Transformers	Dry Type	D. Walker	Centennial FG (3)
3/24/2025	4:45 PM	6:00 PM	SC HVDC Converter Transfs & Smoothing Reactors	HVDC	K. Pointner	Mineral Hall BC (3)
3/27/2025	1:00 PM	5:00 PM	WG Rev P60076-57-129 IEC/IEEE Std for HVDC Conv Trfmrs	HVDC	W. Ziomek	Mineral A (3)
3/28/2025	8:00 AM	12:00 PM	WG Rev P60076-57-129 IEC/IEEE Std for HVDC Conv Trfmrs	HVDC	W. Ziomek	Mineral DE (3)
3/24/2025	9:30 AM	10:45 AM	WG Guide DGA in Ester-Immersed Transformers C57.155	IF	A. Sbravati	Centennial F (3)
3/25/2025	8:00 AM	9:15 AM	WG Guide DGA Applied to Factory Temp Rise Test C57.130	IF	B. Forsyth	Centennial F (3)
3/25/2025	10:00 AM	10:45 AM	WG Guide for the Reclamation of Mineral Oil C57.637	IF	S. Mabrey	Centennial DE (3)
3/25/2025	11:00 AM	12:15 PM	TF Guide for Corrosive Sulfur In Oil-Immersed Trfs & Reactors	IF	L. Lewand	Centennial G (3)
3/25/2025	1:45 PM	3:00 PM	WG DGA in Mineral Oil Transf C57.104	IF	E. teNyenhuys	Centennial DE (3)
3/25/2025	3:15 PM	4:30 PM	WG Guide for DGA in LTCs C57.139	IF	R. Frotscher	Centennial H (3)
3/26/2025	3:00 PM	4:15 PM	SC Insulating Fluids	IF	S. Mabrey	Centennial FG (3)
3/24/2025	9:30 AM	10:45 AM	TF PAR Study Group Temp Rise Test beyond NP C57.119	Ins Life	E. Schweiger	Mineral Hall BC (3)
3/24/2025	11:00 AM	12:15 PM	TF PAR Study Non-C57.91 Loading Characteristics	Ins Life	T. Raymond	Mineral Hall BC (3)
3/24/2025	1:45 PM	3:00 PM	TF - Tests Degradation of Cellulose in Liquid Type Transfuse	Ins Life	L. Lewand	Centennial DE (3)
3/25/2025	3:15 PM	4:30 PM	TF Continuous Rev Clause 11 Temp Rise Tests C57.12.90	Ins Life	D. Sankarakurup	Centennial F (3)
3/26/2025	8:00 AM	9:15 AM	SC Insulation Life	Ins Life	S. Sharpless	Centennial DE (3)
3/24/2025	9:30 AM	10:45 AM	WG Requirements for Instrument Transformers PC57.13	Instr TR	D. Wallace	Centennial H (3)
3/24/2025	11:00 AM	12:15 PM	TF PAR Study Req Low Power Instr Transf	Instr TR	F. Neder	Mineral Hall A (3)
3/25/2025	8:00 AM	9:15 AM	WG Power-Line Carrier Coupling Cap & Volt Transf C57.13.9	Instr TR	Z. Roman	Centennial G (3)
3/25/2025	9:30 AM	10:45 AM	TF Instrument Transf. Accuracy	Instr TR	I. Ziger	Centennial H (3)
3/25/2025	1:45 PM	3:00 PM	TF to Merge C57.13.5 into C57.13	Instr TR	Z. Roman	Mineral Hall BC (3)
3/26/2025	8:00 AM	9:15 AM	SC Instrument Transformers	Instr TR	D. Wallace	Centennial FG (3)

SUBCOMMITTEE MEETING LIST

SPRING 2025 MEETING: MARCH 23 TO MARCH 27

Hyatt Regency Denver; Denver, Colorado, USA

Date	Time Start	Time End	Session Title	Track	Chair	Room/Location
3/26/2025	7:00 AM	8:00 AM	SC Meetings Planning - Arrive early & grab breakfast - All interested individuals welcome	Mtgs	T. Behrens	Mineral Hall A (3)
3/24/2025	9:30 AM	10:45 AM	TF Transformer Data Required for System Studies	PCS	J. Watson	Mineral Hall DEFG (3)
3/24/2025	11:00 AM	12:15 PM	WG Eval Guide Environ Impact of Trans & Reactors PC57.151	PCS	J. Kazmierczak	Centennial DE (3)
3/24/2025	1:45 PM	3:00 PM	TF Audible Sound Revision to Test Code	PCS	R. Girgis	Centennial F (3)
3/24/2025	3:15 PM	4:30 PM	TF PCS Cont. Revisions to C57.12.00	PCS	T. Ansari	Centennial G (3)
3/24/2025	4:45 PM	6:00 PM	WG Std Distributed Photo-Voltaic Transf (DPVTs) C57.159	PCS	P. Hopkinson	Centennial DE (3)
3/25/2025	8:00 AM	9:15 AM	TF PAR Study Loss Eval for Power Trf & Reactors C57.120	PCS	R. Verdolin	Mineral Hall DEFG (3)
3/25/2025	9:30 AM	10:45 AM	TF PCS Cont. Rev. to Test Code C57.12.90	PCS	H. Sahin	Centennial G (3)
3/25/2025	11:00 AM	12:15 PM	WG Sw Transients Ind by TR/Bkr Interaction PC57.142	PCS	J. McBride	Centennial DE (3)
3/25/2025	4:45 PM	6:00 PM	WG Guide for App of Tert & Stabilizing Windings C57.158	PCS	E. Betancourt	Centennial DE (3)
3/25/2025	4:45 PM	6:00 PM	WG Neutral Grounding Devices C57.32	PCS	S. Kennedy	Mineral Hall BC (3)
3/26/2025	3:00 PM	4:15 PM	SC Performance Characteristics	PCS	S. Som	Centennial DE (3)
3/24/2025	9:30 AM	10:45 AM	WG Guide for Tank Rupture Mitigation C57.156	Power	P. Zhao	Centennial G (3)
3/24/2025	11:00 AM	12:15 PM	WG Class 1E Transf for Nuclear Power Gen Std. 638	Power	C. Swinderman	Centennial G (3)
3/24/2025	1:45 PM	3:00 PM	WG Guide for Phase Shifting Transf C57.135	Power	E. Schweiger	Centennial G (3)
3/24/2025	3:15 PM	4:30 PM	WG Guide Eval & Recon of Liquid Immerse Transf C57.140	Power	M. Ferreira	Centennial H (3)
3/24/2025	3:15 PM	4:30 PM	WG Std Reqs for Liquid-Immersed Power Trans C57.12.10	Power	S. Digby	Centennial F (3)
3/24/2025	4:45 PM	6:00 PM	WG Failure Investigation & Reporting PC57.125	Power	H. Sahin	Centennial F (3)
3/25/2025	8:00 AM	9:15 AM	WG Guide for Life Tests of Switch Contacts C57.157	Power	A. Sewell	Mineral Hall A (3)
3/25/2025	9:30 AM	10:00 AM	WG Condition Assessment Guide PC57.170	Power	K. Mani	Centennial DE (3)
3/25/2025	11:00 AM	12:15 PM	WG Standard Requirements for Arc Furnace Transf. C57.17	Power	D. Corsi	Mineral Hall A (3)
3/25/2025	1:45 PM	3:00 PM	WG Liquid Immersed Phase- Shifting Transf 60076-57-1202	Power	E. Schweiger	Centennial G (3)
3/25/2025	3:15 PM	4:30 PM	WG Guide for Install & Maintenance of Power Trf C57.93	Power	S. Reed	Centennial G (3)
3/25/2025	4:45 PM	6:00 PM	WG Guide for Paralleling Transformers C57.153	Power	M. Tostrud	Centennial F (3)
3/26/2025	1:30 PM	2:45 PM	SC Power Transformers	Power	R. Musgrove	Centennial DE (3)
3/24/2025	1:45 PM	3:00 PM	TF IEEE-IEC Cross Reference	Stds	A. Washburn	Mineral Hall A (3)
3/25/2025	3:15 PM	4:30 PM	WG Reverse Power Flow Effects on Trans PC57.133	Stds	R. Hogg	Centennial DE (3)
3/25/2025	4:45 PM	6:00 PM	WG Guide for Field Testing PC57.152	Stds	M. Ferreira	Centennial G (3)
3/26/2025	4:30 PM	5:45 PM	SC Standards	Stds	D. Sauer	Centennial DE (3)
3/24/2025	11:00 AM	12:15 PM	WG 1ph Submersible Transformers PC57.12.23	STNP	A. Traut	Centennial H (3)
3/25/2025	11:00 AM	12:15 PM	WG Liquid-immersed Sec. Network TRs C57.12.40	STNP	J. Vartanian	Mineral Hall BC (3)
3/25/2025	3:15 PM	4:30 PM	WG Guide for Mitigating Corrosion on Sub Trfs C57.12.53	STNP	W. Elliott	Mineral Hall BC (3)
3/26/2025	11:00 AM	12:15 PM	SC Submersible Transf. & Network Protectors	STNP	T. Reiss	Centennial FG (3)

APPENDIX 2

Semi-Annual Standards Report

Standards Report

**March 2025 – Spring Meeting
Denver, CO. USA
Stephen Shull**

PES Transformers Committee

[HOME](#)[Scope](#)[Leaders](#)[Subcommittees ▾](#)[Meetings ▾](#)[Information ▾](#)

HOME

WELCOME TO THE TRANSFORMERS COMMITTEE WEBSITE

The Transformers Committee is one of the largest and most active committees within the IEEE Power and Energy Society (PES). The Committee is comprised of technical and managerial representatives from manufacturers, consultants, vendors and end users of electrical transformers and associated components. The continuing scope of the Committee is the design, testing, repair, installation, operation and maintenance of transformers, reactors and associated components that are used within electric utility and industrial power systems.

[Meetings](#)[Meeting Calendar](#)[2025 Spring – Denver](#)[Latest Mtg Minutes](#)[Break Sponsors](#)

Path to Standards
Report

Video Meeting is now available.





Latest Mtg Minutes

LATEST COMMITTEE MINUTES – SPRING DENVER, COLORADO MEETING

[Minutes of previous meetings](#)

NOTE: Meeting minutes are considered unapproved until they are approved at the next meeting held.

Executive Reports:

Main Minutes .

Chair's Report .

Vice Chair's Report .

Secretary's Report .

[Standards Status Report](#) 14Mar2025

IEEE Standards Association Report .

Treasurer's Report .

Editor's Report .

Recognition and Awards: Report .



Current Standards
Report



Total Number of Documents for which we have responsibility – 119.

Of this number, we have 69 in revision.

Bushing	4		HVDC Applications	2		Performance Characteristics	6
Dielectric	4		Insulating Fluids	7		STNP	2
Dry	11		Insulation Life	3		Power	15
Distribution	7		Instrument	4		Standards	4



There are 20 documents in “Inactive-Reserve” status.

Of the Standards in the “Inactive-Reserve” status, there is one without a PAR.

- C57.144 – Guide to Metric Conversion of Transformer Standards.



Standards Status

Standard Number	Subcommittee	Project Title	Standard Expiration Date
C57.120	Performance Characteristics	Guide for Loss Evaluation of Distribution and Power Transformers and Reactors	31 Dec 2027
60076-16	Performance Characteristics	Power Transformers - Part 16: Transformers for Wind Turbine Application	31 Dec 2028
C57.109	Performance Characteristics	Guide for Liquid-Immersed Transformers Through-Fault-Current Duration	31 Dec 2028
C57.110	Performance Characteristics	Recommended Practice for Establishing Liquid-Immersed and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents	31 Dec 2028
C57.119	Insulation Life	Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings	31 Dec 2028
C57.13.7	Instrument	Standard for Current Transformers with a Maximum mA Secondary Current of 250 mA	31 Dec 2028



The next deadline for submission to either NesCom
or RevCom is

March 28, 2025.

Next NesCom or RevCom Meeting is on
March 26, 2025



External Proposal Management (EPM) Committee Report

Proposal ID #	Title of Proposal/Project	Reviewer Transformer Committee	Committee willing to take oversight of proposal?
P0106	Guide for General Technical Requirements and Test Methods for Converter Valve Anode Saturation Reactor in $\pm 500\text{kV}$ High Voltage Direct Current Transmission System	Ulf Radbrandt	YES
P0136	Recommended Practice for Acoustic Fingerprint-Based Online Monitoring Systems in Substation Equipment	Stephen Shull	MAYBE
P0137	Guide for composite current switching test of vacuum-type on load tap changer for converter transformer	Ulf Radbrandt	YES
P0148	Guide for Arc Test of Liquid-Immersed High-Voltage Direct-Current (HVDC) Converter Transformers	Ulf Radbrandt	MAYBE
P0161	Recommended Practice for Testing the Impact of Harmonic Distortion on the Transformers of a nominal voltage of 10kV and less	Sanjib Som	YES
P0173	Guide for Technical Specification of Smart Distribution Transformer Terminal	Stephen Shull	YES
P0184	Guide for measurement of the polymerization degree of insulating paper/paperboard for power transformers based on terahertz time domain spectroscopy	Stephen Shull	YES
P0197	Guide for Inversion Detection of Hot-spot Temperature and Loading Capacity in Oil-immersed Transformer	Stephen Shull	YES
P0203	Recommended Practice for Inspection of Oil-Filled Equipment in Substation.	Stephen Shull	MAYBE
P0217	Guide for Identification and Analysis of Noise Contribution from Large-scale Power Facilities to the Surrounding Environmental Noise	Stephen Shull	MAYBE
P0230	Guide for testing partial discharge acoustic imaging of electric power equipment	Stephen Shull	MAYBE

Posted Organization Chart

IEEE PES Transformers

Chair: David Wallach

Vice Chair: Bill Griesacker Secretary: Scott Reed Treasurer: Troy Tanaka

Past Chair: Ed teNyenhuis Standards Coordinator: Stephen Shull

Administrative
Chair: David Wallach

Meeting Planning
Chair: Tammy Behrens

Bushings
Chair: Scott Digby
Pg 2

Insulating Fluids
Chair: Stephanie Mabrey
Pg 5

Dielectric Tests
Chair: Dr. Poorvi Patel
Pg 2

Insulation Life
Chair: Sam Sharpless
Pg 5

Distribution Transformers
Chair: Jerry Murphy
Pg 3

Performance Characteristics
Chair: Sanjib Som
Pg 6

Dry Type Transformers
Chair: David Walker
Pg 3

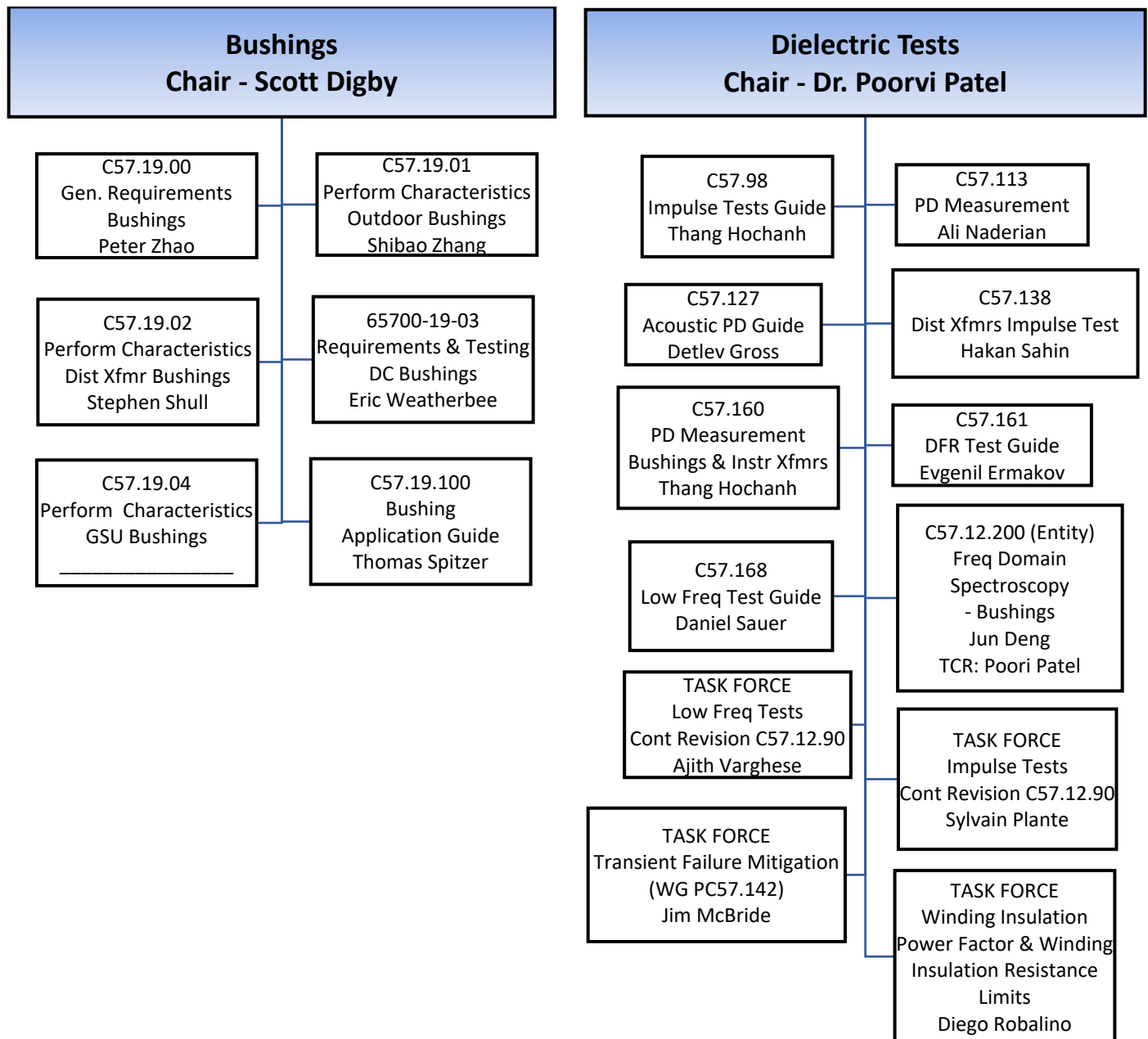
Power Transformers
Chair: Ryan Musgrove
Pg 7

Transformers and Reactors for HVDC
Application
Chair: Klaus Pointner
Pg 4

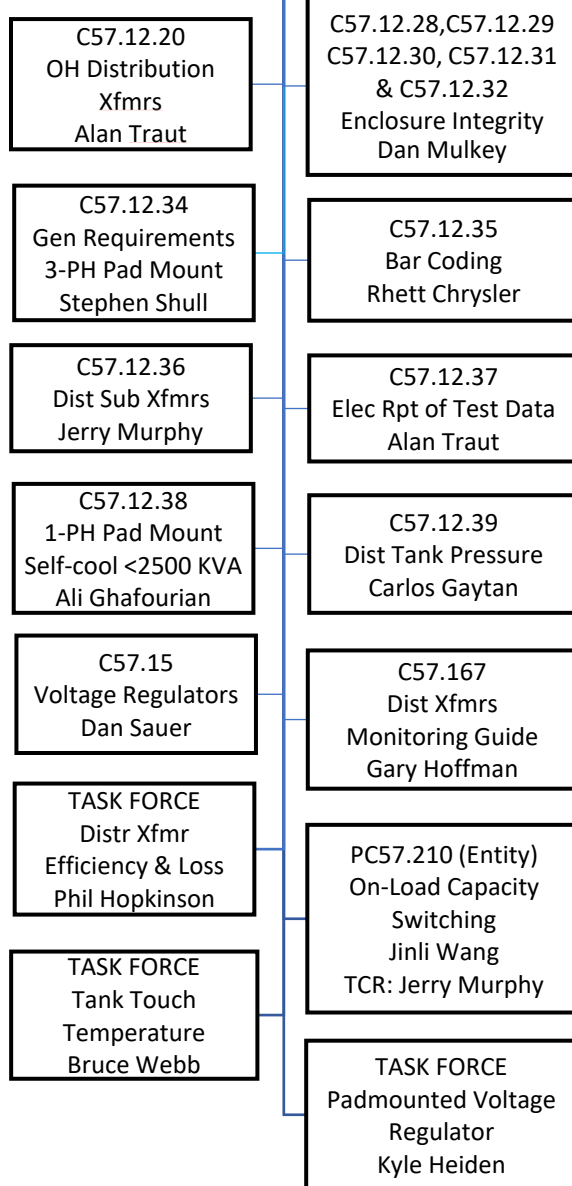
Standards
Chair: Dan Sauer
Pg 8

Instrument Transformers
Chair: David Wallace
Pg 4

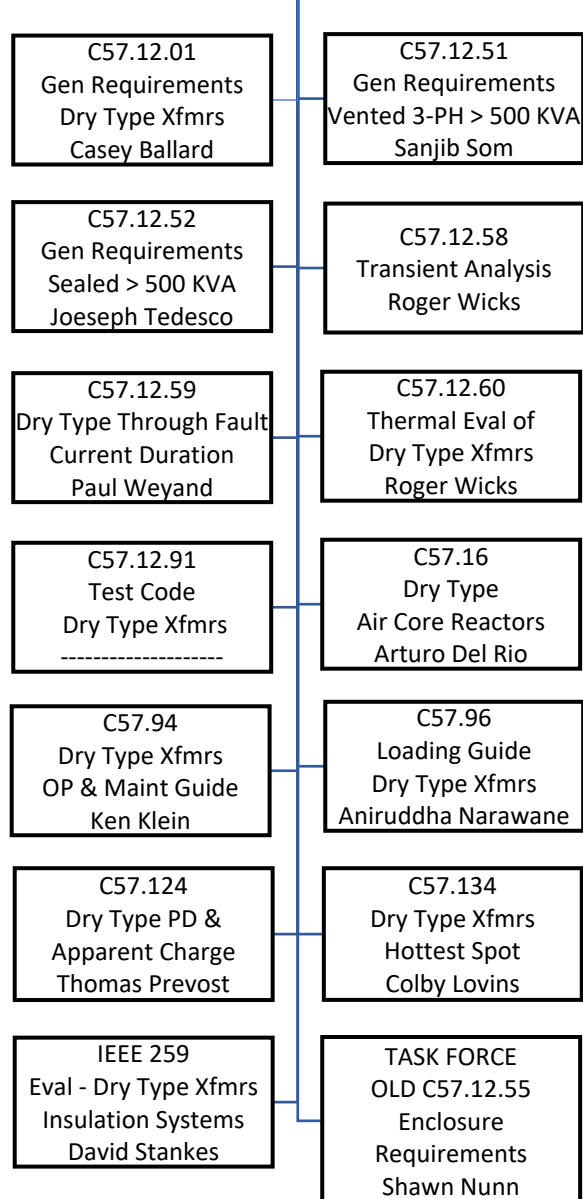
Subsurface Transformers
& Network Protectors
Chair: Tony Reiss
Pg 4



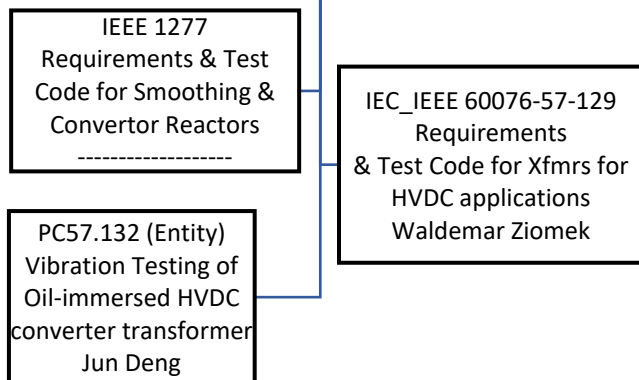
Distribution Transformers Chair - Jerry Murphy



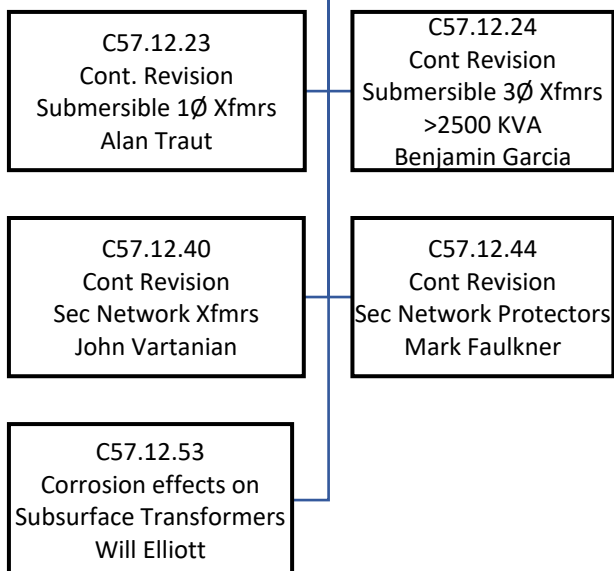
Dry Type Transformers Chair - David Walker



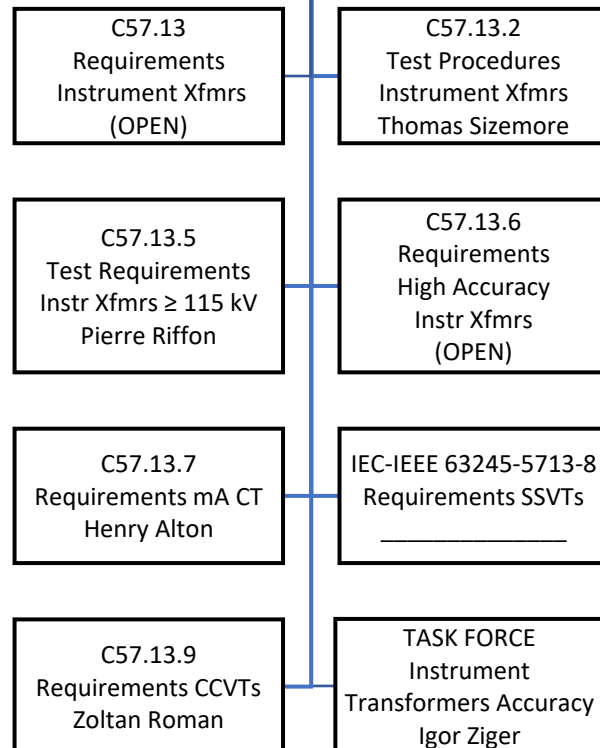
Transformers & Reactors for HVDC Applications Chair - Klaus Pointner

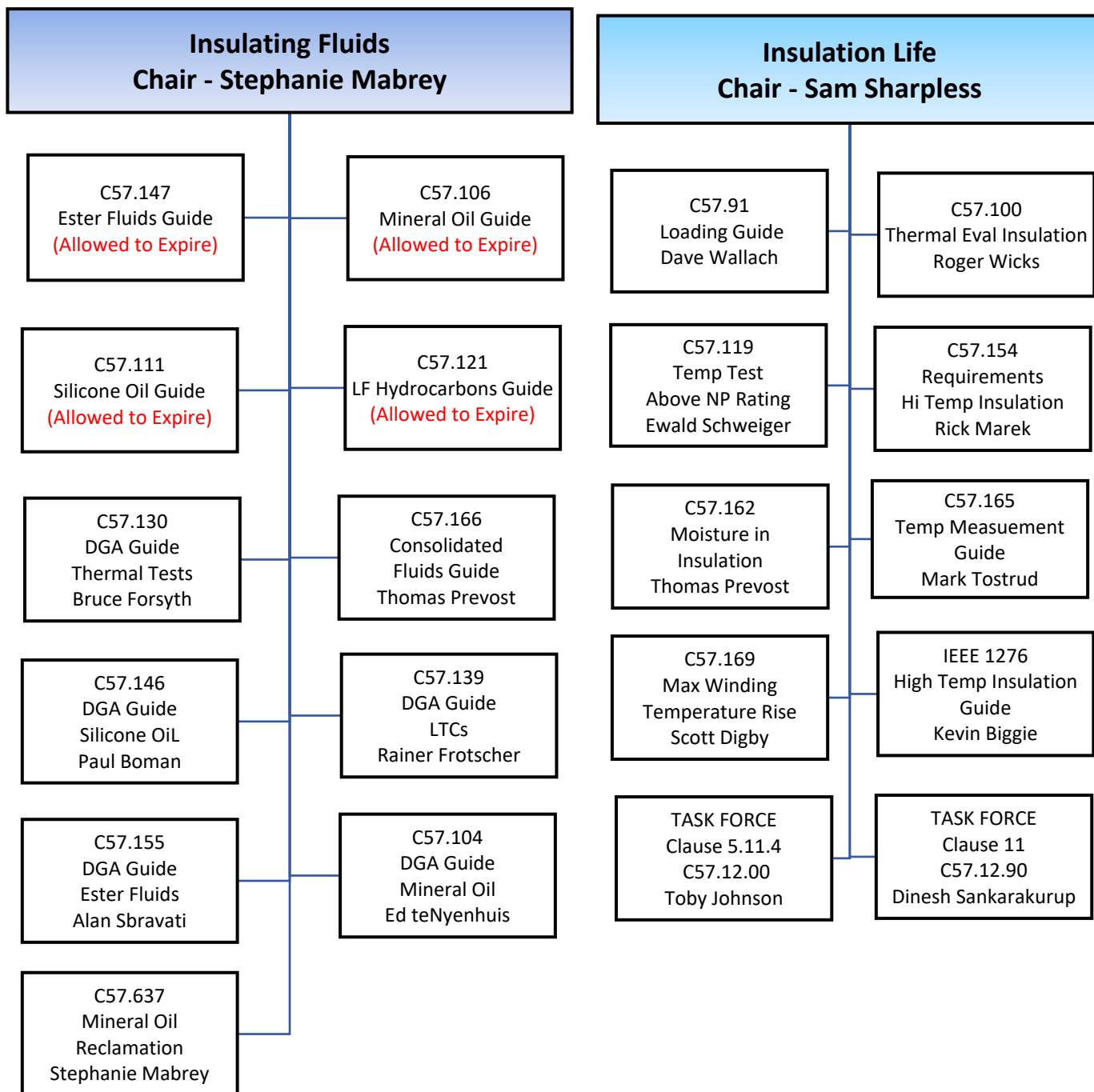


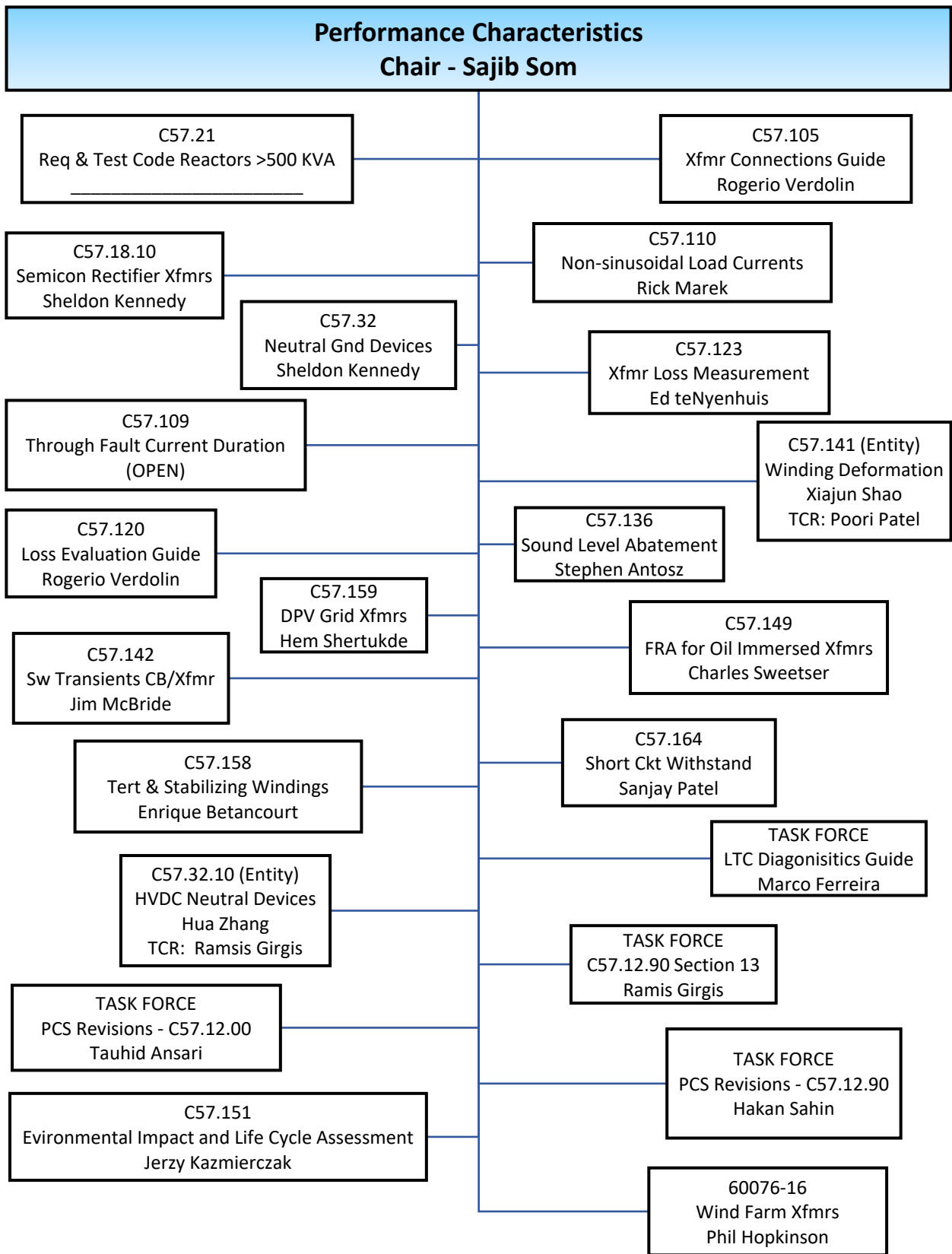
Subsurface Transformers & Network Protectors Chair - Tony Reiss

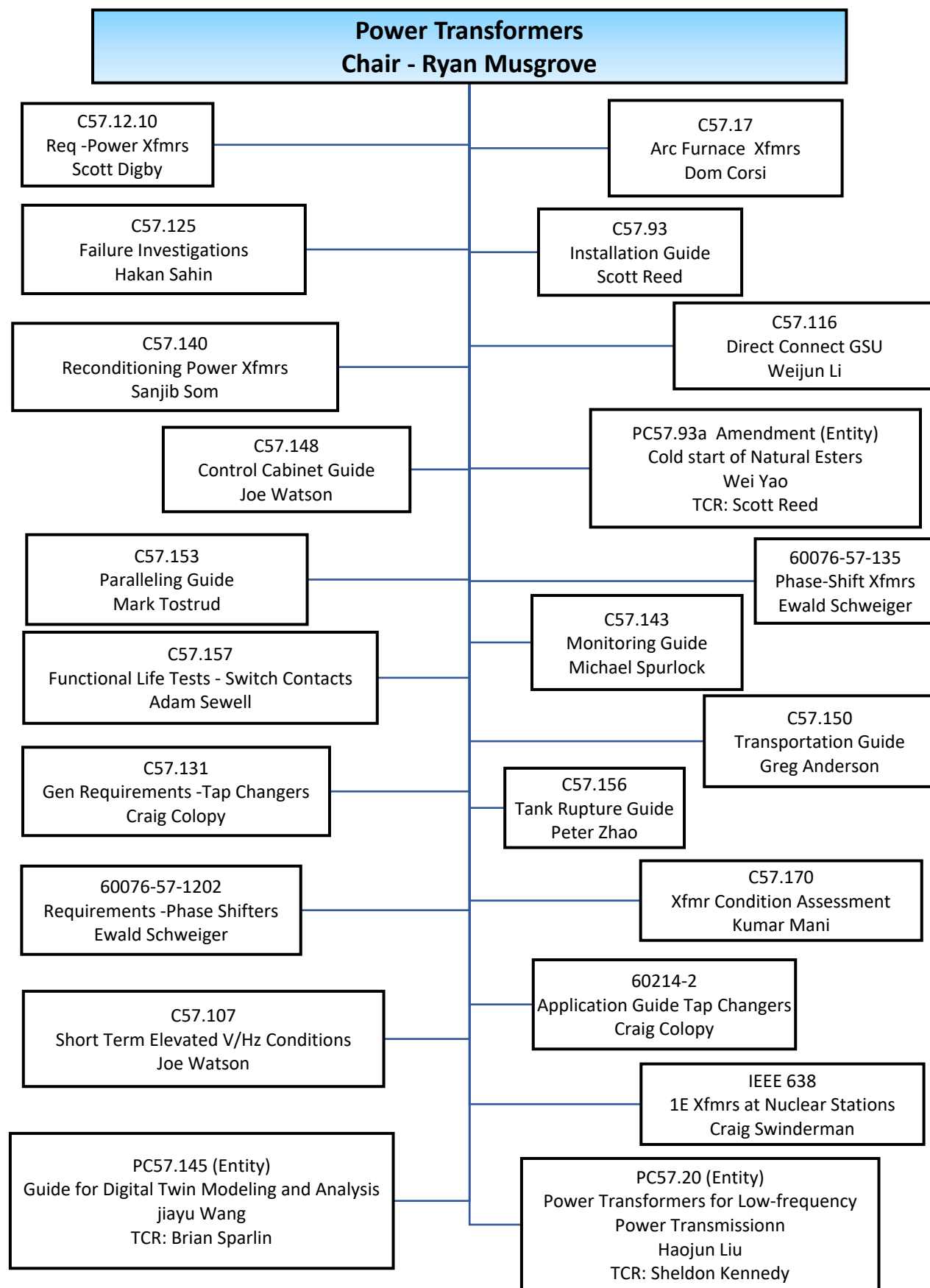


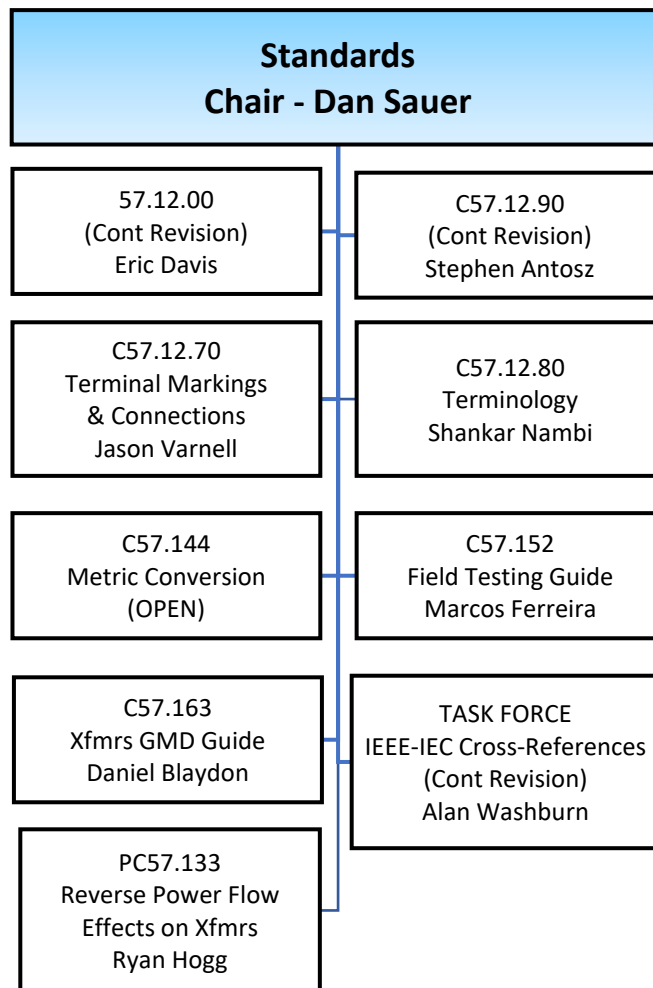
Instrument Transformers Chair - David Wallace











57.12.00
(Cont Revision)
Eric Davis

C57.12.90
(Cont Revision)
Stephen Antosz

C57.12.70
Terminal Markings
& Connections
Jason Varnell

C57.12.80
Terminology
Shankar Nambi

C57.144
Metric Conversion
(OPEN)

C57.152
Field Testing Guide
Marcos Ferreira

C57.163
Xfmrs GMD Guide
Daniel Blaydon

TASK FORCE
IEEE-IEC Cross-References
(Cont Revision)
Alan Washburn

PC57.133
Reverse Power Flow
Effects on Xfmrs
Ryan Hogg

Posted Status Report of Transformer Standards

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee BUSHINGS					
CHAIR:	Scott	Digby	scott.digby@duke-energy.com	(919) 546 - 5798	
65700-19-03	IEC/IEEE International Standard -- Bushings for DC application	Eric Weatherbee	2014	9/23/2021	ACTIVE + PAR for Revision
Individual		(585) 768 - 1272	12/31/2024		Ready to be moved to the NesCom agenda. Waiting on the IEC ballot to close.
PC65700-19-03		eweatherbee@hubbell.com		12/31/2025	
C57.19.00	IEEE Standard General Requirements and Test Procedure for Power Apparatus Bushings		2023		ACTIVE
Individual			12/31/2033		
C57.19.01	IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings	Shibao Zhang	2017	5/22/2024	ACTIVE + PAR for Revision
Individual		(585) 768-1273	12/31/2027		
PC57.19.01		szhang@hubbell.com		12/31/208	
C57.19.02	Standard for Design and Performance Requirements for Bushings Applied to Liquid Immersed Distribution Transformers		2023		ACTIVE
Individual			12/31/2033		
C57.19.04	IEEE Standard for Performance Characteristics and Dimensions for High Current Power Transformer Bushings with Rated Continuous Current in Excess of 5000 A in Bus Enclosures	Scott Digby	2018	9/16/2024	ACTIVE + PAR for Revision
Individual		(919) 546 - 5798	12/31/2028		
PC57.19.04		scott.digby@duke-energy.com		12/31/2028	
C57.19.100	IEEE Guide for Application of Power Apparatus Bushings	Thomas Spitzer	2012	5/21/2019	INACTIVE-RESERVED PAR for Revision+1 PAR Extension
Individual		(817) 584 - 6567	12/31/2022		SA BALLOT: Closed on 12/18/2024 with 153 comments to resolve. Currently in comment resolution.
PC57.19.100		t.spitzer@sbcglobal.net		12/31/2025	

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee DIELECTRIC TESTS					
CHAIR: Dr. Poorvi Patel		papatel@epri.com	(704) 232 - 4551		
C57.113	IEEE Guide for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors		2023		ACTIVE
Individual			12/31/2033		
C57.12.200	IEEE Guide for the Frequency Domain Spectroscopy Measurement of Transformer Bushings		2022		ACTIVE
Entity			12/31/2032		
C57.127	IEEE Guide for the Detection, Location and Interpretation of Sources of Acoustic Emissions from Electrical Discharges in Power Transformers and Power Reactors	Dellev Gross +49 (241) 98091740 gross@ieee.org	2018	2/15/2024	ACTIVE + PAR for Revision
Individual			12/31/2028	12/31/2028	
PC57.127					
C57.138	IEEE Recommended Practice for Routine Impulse Test for Distribution Transformers	Hakan Sahin (208) 220-6963 hakanshaun@gmail.com	2016	6/16/2022	ACTIVE + PAR for Revision
Individual			12/31/2026	12/31/2026	
PC57.138					
C57.160	Draft Guide for the Electrical Measurement of Partial Discharges in High Voltage Bushings and Instrument Transformers		2023		ACTIVE
Individual			12/31/2033		
C57.161	IEEE Guide for Dielectric Frequency Response Test	Evgenii Ermakav evgenii@ieee.org	2018	5/22/2024	ACTIVE + PAR for Revision
Individual			12/31/2028	12/31/2026	
PC57.161					
C57.168	IEEE Guide for Low Frequency Dielectric Testing for Distribution, Power and Regulating Transformers		2023		ACTIVE
Individual			12/31/2033		
C57.98	IEEE Guide for Transformer Impulse Tests	Thang Hochanh (819) 821-3636 thanghochanh@surplec.com	2011	10/27/2018	INACTIVE-RESERVED + PAR Revision+ 2PAR Extension
Individual			12/31/2021	12/31/2026	SA BALLOT: Currently in ballot. Scheduled to close on 03/23/2025.
PC57.98					

IEEE/PES TRANSFORMERS COMMITTEE

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee DISTRIBUTION TRANSFORMERS					
CHAIR: Jerry Murphy		jerry.murphy@ieee.org	(407) 824 - 4194		
Individual	Standard Requirements for Pad-Mounted Compartmental-Type Step-Voltage Regulators	Kyle Heiden		2/13/2025	ACTIVE PAR
PCC57.15.01		kylejheiden@eaton.com		12/31/2029	
C57.12.20	IEEE Standard for Overhead Type Distribution Transformers, 500 kVA and Smaller, High-Voltage 34 500 Volts and Below; Low-Voltage, 7970/13 800 Y Volts and Below		2023		ACTIVE
Individual			12/31/2033		
C57.12.28	IEEE Standard for Pad Mounted Equipment - Enclosure Integrity		2023		ACTIVE
Individual			12/31/2033		
C57.12.29	IEEE Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments		2023		ACTIVE
Individual			12/31/2033		
C57.12.30	IEEE Standard for Pole-Mounted Equipment - Enclosures for Coastal Environment		2020		ACTIVE
Individual			12/31/2030		CO-STD-COM – Switchgear
C57.12.31	IEEE Standard for Pole Mounted Equipment - Enclosure Integrity		2020		ACTIVE
Individual			12/31/2030		CO-STD-COM – Switchgear
C57.12.32	IEEE Standard for Submersible Equipment - Enclosure Integrity	Daniel Mulkey	2019	12/6/2023	ACTIVE + PAR for Revision
Individual		(707) 776 - 7346	12/31/2029		
PC57.12.32		dhmulkey@ieee.org		12/31/2027	
C57.12.34	IEEE Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 10 MVA and Smaller; High-Voltage, 34.5 kV Nominal System Voltage and Below; Low-Voltage, 15 kV Nominal System Voltage and Below	Stephen Shull	2022	2/15/2023	ACTIVE + PAR for Revision
Individual		(417) 206 - 4047	12/31/2032		
PC57.12.34		sdshull@ieee.org		12/31/2027	

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee DISTRIBUTION TRANSFORMERS					
CHAIR: Jerry Murphy		jerry.murphy@ieee.org	(407) 824 - 4194		
C57.12.35	IEEE Standard Bar Coding for Distribution Transformers and Step-Voltage Regulators		2024		ACTIVE
Individual			12/31/2034		
C57.12.36	IEEE Standard Requirements for Liquid-Immersed Distribution Substation Transformers	Jerry Murphy (407) 824 - 4194 jerry.murphy@ieee.org	2017	6/29/2023	ACTIVE + PAR for Revision
Individual			12/31/2027		SA BALLOT: Currently in ballot. Scheduled to close on 03/26/2025
PC57.12.36				12/31/2027	
C57.12.37	IEEE Standard for the Electronic Reporting of Transformer Test Data	Alan Traut (601) 422 - 1198 atraut@ieee.org	2015	2/15/2024	ACTIVE + PAR for Revision
Individual			12/31/2025		
PC57.12.37				12/31/2028	
C57.12.38	IEEE Standard for Pad-Mounted-Type, Self-Cooled, Single-Phase Distribution Transformers 250 kVA and Smaller: High Voltage, 34 500 GrdY/19 920 V and Below; Low Voltage, 480/240 V and Below		2025		ACTIVE
Individual			12/31/2035		
PC57.12.38					
C57.12.39	IEEE Standard for Requirements for Distribution Transformer Tank Pressure Coordination	Carlos Gaytan 52 818 030 - 2162 gaytan@ieee.org	2017	2/15/2024	ACTIVE + PAR for Revision
Individual			12/31/2027		
PC57.12.39				12/31/2028	
C57.15	IEEE Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators	Daniel Sauer (262) 896 - 2417 dmsauer@mtu.edu	2017	2/15/2024	ACTIVE + PAR for Revision
Individual			12/31/2027		
PC57.12.39				12/31/2028	
C57.167	IEEE Guide for Monitoring Distribution Transformers		2023		ACTIVE
Individual			12/31/2033		
C57.210	IEEE Recommended Practice for On-load Capacity Switching Distribution Transformers		2024		ACTIVE
Entity			12/31/2034		ORIGINALLY AN ENTITY STD. THIS NOW HAS THE OPPORTUNITY TO BE CHANGED TO INDIVIDUAL STD

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone		Rev Due Date	Remark
PROJECT		Email		PAR Expiration	
SubCommittee DRY TYPE TRANSFORMERS					
CHAIR: David Walker		djwalker1260@gmail.com		(520) 484 - 5338	
Individual	Standard for Enclosure Requirements for Dry-type Transformers	Shawn Nunn		2/13/2025	ACTIVE PAR
PC57.12.55		shawn.t.nunn@hitachienergy.com		12/31/2029	
259	IEEE Standard Test Procedure for Evaluation of Systems of Insulation for Dry-Type Specialty and General-Purpose Transformers	David Stankes	1999	12/3/2020	INACTIVE-RESERVED+ PAR for Revision+1PAR extension
Individual		(512) 984 - 5026	12/31/2020		Standard was allowed to expire by the SC. However, when revising IEEE C57.12.60, the need for this standard was recognized.
P259		dsstankes@mmm.com		12/31/2026	
C57.12.01	IEEE Standard for General Requirements for Dry-Type Distribution and Power Transformers	Casey Ballard	2020	2/23/2022	ACTIVE + PAR for Revision
Individual		(804) 292 - 5207	12/31/2030		This standard is under continuous revision.
PC57.12.01		robert.c.ballard@ieee.org		12/31/2026	
C57.12.51	IEEE Guide for Mechanical Interchangeability of Ventilated Dry-Type Transformers		2019		ACTIVE
Individual			12/31/2029		
C57.12.52	IEEE Standard for Sealed Dry-Type Power Transformers, 501 kVA and Higher, Three-Phase, with High-Voltage 601 to 34500 Volts, Low-Voltage 208Y/120 to 4160 Volts--General Requirements		2024		ACTIVE
Individual			12/31/2034		
C57.12.58	IEEE Guide for Conducting a Transient Voltage Analysis of a Dry-Type Transformer Coil	Ken Kline	2017	5/22/2024	ACTIVE + PAR for Revision
Individual			12/31/2027		
PC57.12.58		ken.klein@kearsargepower.com		12/31/2028	
C57.12.59	IEEE Guide for Dry-Type Transformer Through-Fault Current Duration	Paul Weyandt	2015	6/16/2022	ACTIVE + PAR for Revision
Individual			12/31/2025		
PC59.12.59		paul.weyanandt@se.com		12/31/2026	
C57.12.60	IEEE Standard for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers	Roger Wicks	2020	2/13/2025	ACTIVE + PAR for Revision
Individual		(804) 383 - 3300	12/31/2030		This corrigendum is to modify the text in Clause 8.2 of the document to reference correct equation, Equation (4), used to calculate T1.
PC57.12.60/Cor 1		roger.c.wicks@dupont.com		12/31/2029	

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee DRY TYPE TRANSFORMERS					
CHAIR: David Walker		djwalker1260@gmail.com		(520) 484 - 5338	
C57.12.91	IEEE Standard Test Code for Dry-Type Distribution and Power Transformers	David Walker	2020	2/23/2022	ACTIVE + PAR for Revision
Individual		(520) 484 - 5338	12/31/2030		This standard is under continuous revision.
PC57.12.91		djwalker1260@gmail.com		12/31/2026	
C57.124	IEEE Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry-Type Transformers	Thomas Prevost	1991	6/15/2017	INACTIVE-RESERVED +PAR for Revision+2PAR Extension
Individual		(802) 751 - 3458	12/31/2019		Invitation to ballot expired with no action. A new invitation will have to be started. For the next revision it has been proposed that C57.113 and this document be combined to reduce the effort.
PC57.124		tprevost@ieee.org		12/31/2025	
C57.134	IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers		2024		ACTIVE
Individual			12/31/2034		
C57.16	IEEE Standard Requirements, Terminology, and Test Code for Dry-Type Air- Core Series- Connected Reactors	J. Arturo Del Rio	2011	2/5/2016	INACTIVE-RESERVED +PAR for Revision+2PAR Extension
Individual		(919) 449 - 5675	12/31/2021		SA BALLOT: Closed on 10/18/2024 with 76 comments to resolve. Currently in comment resolution.
PC57.16		a.delrio@ieee.org		12/31/2025	
C57.94	IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers	Ken Kline	2015	2/23/2022	ACTIVE + PAR for Revision
Individual			12/31/2025		SA BALLOT: Closed on 02/25/2025 with 55 comments to resolve. Currently in comment resolution.
PC57.94		ken.klein@kearsargepower.com		12/31/2026	
C57.96	IEEE Guide for Loading Dry-Type Distribution and Power Transformers	Aniruddha Narawane	2013	2/10/2021	INACTIVE RESERVE + PAR for Revision
Individual		(804) 229 - 5956	12/31/2023		SA BALLOT: Closed on 02/24/2025 with 156 comments to resolve. Currently in comment resolution.
PC57.96		aniraj200@yahoo.com		12/31/2025	

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone		Rev Due Date	Remark
PROJECT		Email		PAR Expiration	
SubCommittee INSTRUMENT TRANSFORMERS					
CHAIR: David Wallace		daweleceng@aol.com		(662) 325 - 2009	
Entity	Draft Guide for Calibration of Energized Current Transformers for 34.5 kV and Below	Yunguo Yang		3/22/2022	Active PAR
PC57.13.10		77766711@qq.com		12/31/2026	TCR: Thomas Sizemore
Individual	Standard Requirements for Low Power Instrument Transformers for 69kV or Higher Nominal System Voltage	Frank Neder		2/13/2025	ACTIVE PAR
PC57.13.11		frankneder@gmail.com		12/31/2029	
Individual	Draft Standard for Power-Line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers	Zoltan Roman		3/23/2017	Active PAR + 2 PAR Extension
PC57.13.9		(706) 360 - 4964 zoltan.roman@ge.com		12/31/2025	SA BALLOT: Closed 10/21/2022 with 662 comments to resolve. Currently in Comment Resolution. Chair to submit a PAR extension as per email 10/11/2024. CO-STD-COM – PSCC
C57.13	IEEE Standard Requirements for Instrument Transformers	David Wallace	2016	3/24/2022	ACTIVE + PAR for Revision
Individual		(662) 325 - 2009 daweleceng@aol.com	12/31/2026	12/31/2026	
C57.13.2	IEEE Conformance Test Procedure for Instrument Transformers		2005		INACTIVE-RESERVED
Individual			12/31/2020		To be combined into C57.13 and no longer maintained.
C57.13.5	IEEE Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above		2019		ACTIVE
Individual			12/31/2029		To be combined into C57.13 and no longer maintained.
C57.13.6	IEEE Standard for High Accuracy Instrument Transformers		2005		INACTIVE-RESERVED
Individual			12/31/2020		To be combined into C57.13 and no longer maintained.
C57.13.7	IEEE Standard for Current Transformers with Maximum Milliampere Secondary Current of 250 mA		2018		ACTIVE
Individual			12/31/2028		

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee INSTRUMENT TRANSFORMERS					
CHAIR: David Wallace		daweleceng@aol.com		(662) 325 - 2009	
P63253-5713-8	IEC/IEEE Standard Requirements for Station Service Voltage Transformers	David Wallace	2024		ACTIVE
Individual		(662) 325 - 2009	12/31/2034		PAR Request submitted to Subcommittee
P63253-5713-8/Co		daweleceng@aol.com			

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STANDARD BALLOT TYPE PROJECT		Working Group Chair Phone Email	Approved Year Rev Due Date	PAR Issue Date PAR Expiration	Standard Status Remark
SubCommittee INSULATING FLUIDS					
CHAIR: Stephaney Mabrey		stephanie.mabrey@avodiagnostics.com (214) 502 - 2969			
Individual PC57.166	Draft Guide for Acceptance and Maintenance of Insulating Liquids in Transformers and Related Equipment	Thomas Prevost (802) 751 - 3458 tprevost@ieee.org		3/8/2018 12/31/2026	Active PAR + 2 PAR Extension This Standard will combine C57.106, C57.111, C57.121 and C57.147 plus added content. SA BALLOT: Closed 3/30/2024 with 352 comments to resolve.
C57.104 Individual PC57.104	IEEE Guide for the Interpretation of Gases Generated in Mineral Oil-Immersed Transformers	Ed teNyenhuis (416) 270 - 9026 edt@ieee.org	2019 12/31/2029	5/22/2024 12/31/2028	ACTIVE + PAR for Revision
C57.106 Individual	IEEE Guide for Acceptance and Maintenance of Mineral Insulating Oil in Electrical Equipment		2015 12/31/2025		ACTIVE This will be contained in the new C57.166 standard.
C57.111 Individual	IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers		1989 3/19/2019		INACTIVE-RESERVED This will be contained in the new C57.166 standard.
C57.121 Individual	IEEE Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers		1998 12/9/2019		INACTIVE-RESERVED This will be contained in the new C57.166 standard.
C57.130 Individual PC57.130	IEEE Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors	Bruce Forsyth (405) 473 - 8300 bruce.forsyth@ieee.org	2015 12/31/2025	3/24/2022 12/31/2026	ACTIVE - PAR for Revision
C57.139 Individual PC57.139	IEEE Guide for Dissolved Gas Analysis in Transformer Load Tap Changers	Rainer Frotscher r.frotscher@reinhausen.com	2015 12/31/2025	3/24/2022 12/31/2026	ACTIVE - PAR for Revision
C57.146 Individual PC57.146	IEEE Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers	Paul Boman (785) 256 - 7161 paul_boman@hsb.com	2005 12/31/2021	3/5/2020 12/31/2026	INACTIVE-RESERVED +PAR for Revision+1PAR extension SA BALLOT: Currently in ballot. Scheduled to close on 04/12/2025

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee INSULATING FLUIDS					
CHAIR: Stephaney Mabrey stephanie.mabrey@avodiagnostics.com (214) 502 - 2969					
C57.147	IEEE Guide for Acceptance and Maintenance of Natural Insulating Liquid in Transformers		2018		ACTIVE
Individual			12/31/2028		This will be contained in the new C57.166 standard.
C57.155	IEEE Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformers	Alan Sbravati	2014	9/23/2021	ACTIVE + PAR for Revision
Individual		(612) 413 - 4599	12/31/2024		
PC57.155		alan_sbravati@cargill.com		12/31/2025	
C57.637	IEEE Guide for the Reclamation of Mineral Insulating Oil and Criteria for Its Use	Stephanie Mabrey	2015	9/23/2021	ACTIVE + PAR for Revision
Individual		(214) 502 - 2969	12/31/2025		
PC57.637		stephaniemabrey@avodiagnostics.com		12/31/2025	

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee INSULATION LIFE					
CHAIR: Samuel Sharpless		slsharpless@rimkus.com		(407) 661 - 1245	
Individual PC57.162	Draft Guide for the Interpretation of Moisture Related Parameters in Liquid Immersed Transformers and Reactors	Thomas Prevost (802) 751 - 3458 tprevost@ieee.org		8/23/2013 12/31/2025	Active PAR + 5 PAR Extensions SA BALLOT: Closed on 12/27/2024 with 7 comments to resolve. Currently in comment resolution
Individual P1276a	IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Distribution, Power, and Regulating Transformers	Kevin Biggie kevin.biggie@weidmann-group.com	2020 12/31/2030	3/23/2022 12/31/2026	ACTIVE + PAR for Amendment Amendment: Update to Annex B and corresponding reference in Annex D. Invitation to BALLOT: Closed on 02/28/2025
Individual 1538	IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid Filled Transformer		2000 12/31/2021		INACTIVE-RESERVED Please note that this document will be allowed to go inactive as it is being replaced by C57.169.
Individual 1538a	IEEE Guide for Determination of Maximum Winding-Temperature Rise in Liquid Immersed Transformers -- Amendment 1		2015 12/31/2021		INACTIVE-RESERVED Please note that this document will be allowed to go inactive as it is being replaced by C57.169.
Individual C57.100	IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution and Power Transformers		2022 12/31/2032		ACTIVE
Individual C57.119	IEEE Recommended Practice for Performing Temperature Rise Tests on Liquid Immersed Power Transformers at Loads Beyond Nameplate Ratings		2018 12/31/2028		ACTIVE
Individual C57.154	IEEE Standard for Liquid-Immersed Transformers Designed to Operate at Temperatures Above Conventional Limits Using High-Temperature Insulation Systems		2022 12/31/2032		ACTIVE
Individual C57.165	IEEE Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors		2024 12/31/2034		ACTIVE

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee INSULATION LIFE					
CHAIR: Samuel Sharpless		slsharpless@rimkus.com		(407) 661 - 1245	
C57.169	IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid-Immersed Transformers		2023		ACTIVE
Individual			12/31/2033		
C57.91	IEEE Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators	David Wallach	2011	9/28/2017	INACTIVE-RESERVED+PAR for Revision+1 PAR Extension
Individual		(980) 373 - 4167	12/31/2021		SA BALLOT: Closed on 02/15/2024 with 448 comments to resolve. Currently in comment resolution.
PC57.91		david.wallach@duke-energy.com		12/31/2025	

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee PERFORMANCE CHARACTERISTICS					
CHAIR: Sanjib Som		ssom@patransformer.com	(724) 705-3050		
Entity	Draft Guide for Detection, Monitoring, and Evaluation of Winding Deformation in Liquid-Immersed Power Transformers	Xianjun Shao		9/23/2021	Active PAR
PC57.141		shaoxianjun0575@163.com		12/31/2025	TCR: Poori Patel
Individual	Draft Guide for the Evaluation of the Environmental Impact and Life Cycle Assessment of Transformers and Shunt Reactors	Jerzy Kazmierczak		9/26/2024	Active PAR
PC57.151		jerzy.kazmierczak@hitachienergy.com		12/31/2028	
60076-16	IEC/IEEE International Standard - Power transformers - Part 16: Transformers for wind turbine applications		2018		ACTIVE
Individual			12/31/2028		
C57.105	IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems		2019		ACTIVE
Individual			12/31/2029		
C57.105/COR 1	IEEE Guide for Application of Transformer Connections in Three-Phase Electrical Systems - 2019 STD Corrigendum 1 Update Table 1—Application characteristics of connections		2023		ACTIVE
Individual			12/31/2033		
C57.109	IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration		2018		ACTIVE
Individual			12/31/2028		
C57.110	IEEE Recommended Practice for Establishing Liquid Immersed and Dry-Type Power and Distribution Transformer Capability when Supplying Nonsinusoidal Load Currents		2018		ACTIVE
Individual			12/31/2028		
C57.120	IEEE Guide for Loss Evaluation of Distribution and Power Transformers and Reactors		2017		ACTIVE
Individual			12/31/2027		
C57.123	IEEE Guide for Transformer Loss Measurement		2019		ACTIVE
Individual			12/31/2029		

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BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee PERFORMANCE CHARACTERISTICS					
CHAIR: Sanjib Som		ssom@patransformer.com	(724) 705-3050		
C57.136	IEEE Guide for Sound Level Abatement and Determination for Liquid- Immersed Power Transformers and Shunt Reactors Rated Over 500 kVA		2023		ACTIVE
Individual			12/31/2033		
C57.142	IEEE Guide To Describe The Occurrence And Mitigation Of Switching Transients Induced By Transformer-Breaker Interaction	Jim McBride (770) 460-6626 jim@jmxhv.com	2010	3/23/2017	INACTIVE-RESERVED+PAR Revision+2 PAR Extensions
Individual			12/31/2020		SA BALLOT: Closed on 4/27/22 with 305 comments to resolve. Currently in Comment Resolution.
PC57.142				12/31/2025	CO-STD-COM – Switchgear
C57.149	IEEE Guide for the Application and Interpretation of Frequency Response Analysis for Oil Immersed Transformers		2024		ACTIVE
Individual			12/31/2034		
C57.158	IEEE Guide for the Application of Tertiary and Stabilizing Windings in Power Transformers	Enrique Betancourt 52 818 030 - 2135 ebetanco@ieee.org	2017	6/29/2023	ACTIVE + PAR for Revision
Individual			12/31/2027		
PC57.158				12/31/2027	
C57.159	IEEE Guide on Transformers for Application in Distributed Photovoltaic (DPV) Power Generation Systems	Hemchandra Shertukde (860) 768 - 4847 shertukde@hartford.edu	2016	2/15/2024	ACTIVE + PAR for Revision
Individual			12/31/2026		
PC57.159				12/31/2028	
C57.164	IEEE Guide for Establishing Short Circuit Withstand Capabilities of Liquid Immersed Power Transformers, Regulators, and Reactors		2021		Active
Individual			12/31/2031		
C57.18.10	IEEE Standard Practices and Requirements for Semiconductor Power Rectifier Transformers		2021		ACTIVE
Individual			12/31/2031		
C57.21	IEEE Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA		2021		ACTIVE
Individual			12/31/2031		

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee PERFORMANCE CHARACTERISTICS					
CHAIR:	Sanjib	Som	ssom@patransformer.com	(724) 705-3050	
C57.32	IEEE Standard Requirements, Terminology, and Testing Procedures for Neutral Grounding Devices	Sheldon Kennedy	2015	2/15/2023	ACTIVE + PAR for Revision
Individual		(716) 896 - 6500	12/31/2025		
PC57.32		skennedy@niagaratransformer.com	12/31/2027		
C57.32.10	IEEE Guide for the Selection of Neutral-Grounding Devices for High Voltage Direct Current (HVDC) Converter Transformers		2025		ACTIVE
Entity			12/31/2035		ORIGINALLY AN ENTITY STD. THIS NOW HAS THE OPPORTUNITY TO BE CHANGED TO INDIVIDUAL STD.
C57.32a	IEEE Standard for Requirements, Terminology, and Test Procedure for Neutral Grounding Devices--Amendment 1: Neutral Grounding Resistors Clause (AM)		2020		ACTIVE
Individual			12/31/2025		TO BE INCLUDED IN THE NEW REVISION OF C57.32.

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BALLOT TYPE		Phone		Rev Due Date	Remark
PROJECT		Email		PAR Expiration	
SubCommittee POWER TRANSFORMERS					
CHAIR: Ryan Musgrove		ryan.musgrove@ieee.org		(405) 747 - 7960	
Entity	Draft Guide for Digital Twin Modeling and Analysis of Power Transformers with High Voltages 69 kV up to 161 kV	Jiayu Wang		6/5/2023	ACTIVE PAR
PC57.145		wjy911106@163.com		12/31/2027	TCR: Brian Sparlin
Individual	Draft Guide for the Condition Assessment of Liquid Immersed Transformers, Reactors and Their Components	Kumar Mani		9/5/2019	ACTIVE + PAR Revision + 1 PAR Extension
PC57.170		(919) 546 - 2791 kumar.mani@duke-energy.com		12/31/2025	SA BALLOT: Closed on 10/02/2024 with 171 coment to resolve. Currently in comment resolution.
Entity	Draft Guide for Power Transformers for Low-frequency (10 Hz to 30 Hz) Power Transmission	Haojun Liu		2/15/2024	ACTIVE PAR
PC57.20		liu_haojun@zj.sgcc.com.cn		12/31/2028	TCR: Sheldon Kennedy
Entity	Draft Guide for Installation and Maintenance of Liquid-Immersed Power Transformers Amendment: Cold Start of Power Transformers filled with Natural Ester Fluids	Wei Yao		3/5/2020	ACTIVE PAR for Amendment
PC57.93a		 yaoweidky@163.com		12/31/2024	Currently on the 3/26/2025 NesCom agenda TCR: Scott Reed
60076-16	Power Transformers - Part 16: Transformers for Wind Turbine Application		2018		ACTIVE
Individual			12/31/2028		
NONE					
60076-57-1202	IEC/IEEE International Standard Power transformers --Part 57-1202: Liquid immersed phase-shifting transformers	Ewald Schweiger	2016	9/26/2024	ACTIVE + PAR for Revision
Individual			12/31/2026		
PC60076-57-1202				12/31/2028	
60214-2	IEEE Draft Standard for Tap-Changers - Part 2: Application Guide		2019		ACTIVE
Individual			12/31/2029		
638	IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations	Craig Swinderman	2013	12/6/2023	INACTIVE RESERVE + PAR for Revision
Individual		(724) 816 - 4476	12/31/2023		
P638		craig.swinderman@meppi.com		12/31/2027	

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee POWER TRANSFORMERS					
CHAIR:	Ryan Musgrove	ryan.musgrove@ieee.org		(405) 747 - 7960	
C57.107	IEEE Recommended Practice for Developing Design-Specific Operational Limits for Transformers Connected to Generators or Power Systems Subject to Significant Short-Term Changes in Voltage or Frequency		2024		ACTIVE
Individual			12/31/2034		
C57.116	IEEE Guide for Transformers Directly Connected to Generators		2022		ACTIVE
Individual			12/31/2032		
C57.12.10	IEEE Standard Requirements for Liquid-Immersed Power Transformers		2017	9/26/2024	ACTIVE + PAR for Revision
Individual			12/31/2027		
PC57.12.10				12/31/2028	
C57.125	IEEE Guide for Failure Investigation, Documentation, Analysis, and Reporting for Power Transformers and Shunt Reactors	Hakan Sahin	2015	5/21/2021	ACTIVE+ PAR for Revision
Individual		(208) 220-6963	12/31/2025		
PC57.125		hakanshaun@gmail.com		12/31/2025	
C57.131	IEEE Standard Requirements for Tap Changers		2024		ACTIVE
Individual			12/31/2034		
C57.135	IEEE Guide for the Application, Specification and Testing of Phase- Shifting Transformers	Ewald Schweiger	2011	6/16/2022	INACTIVE-RESERVED + PAR for Revision
Individual			12/31/2021		
PC57.135				12/31/2026	
C57.140	IEEE Guide for Evaluation and Reconditioning of Liquid Immersed Power Transformers	Marcos Ferreira	2017	2/13/2025	ACTIVE + PAR for Revisions
Individual		(971) 703 - 0777	12/31/2027		
PC57.140		mdferreira@comcast.net		12/31/2029	
C57.143	IEEE Guide for Application for Monitoring Equipment to Liquid-Immersed Transformers and Components		2012		ACTIVE
Individual			12/31/2022		

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee POWER TRANSFORMERS					
CHAIR: Ryan Musgrove		ryan.musgrove@ieee.org	(405) 747 - 7960		
C57.148	IEEE Standard for Control Cabinets for Power Transformers		2020		ACTIVE
Individual			12/31/2030		
C57.150	IEEE Guide for the Transportation of Transformers and Reactors Rated 10 000 kVA or Higher		2023		ACTIVE
Individual			12/31/2033		
C57.153	IEEE Guide for Paralleling Power Transformers	Mark Tostrud	2015	11/8/2023	ACTIVE + PAR for Revision
Individual		(262) 746 - 1230	12/31/2025		
PC57.153		mark.tostrud@dynamicratings.com		12/31/2027	
C57.156	IEEE Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors	Peter Zhao	2016	6/5/2023	ACTIVE + PAR for Revision
Individual		(416) 345 - 5926	12/31/2026		
PC57.156		peter.zhao@hydroone.com		12/31/2027	
C57.157	IEEE Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid-Immersed Transformers	Adam Sewell	2015	6/5/2023	ACTIVE + PAR for Revision
Individual		(330) 872 - 5707	12/31/2025		
PC57.157		adamsewell@qualityswitch.com		12/31/2027	
C57.17	IEEE Standard Requirements for Arc Furnace Transformers	Domenico Corsi	2012	6/5/2023	INACTIVE-RESERVED + PAR for Revision
Individual			12/31/2022		
PC57.17		transkraft@neo.rr.com		12/31/2027	
C57.93	IEEE Approved Draft Guide for Installation and Maintenance of Liquid-Immersed Power Transformers	Scott Reed	2019	5/22/2024	ACTIVE +PAR for Revision
Individual		(330) 498 - 6259	12/31/2029		PC57.93a is currently close to being approved. CONSIDER MERGING THIS INTO THIS NEW REVISION.
PC57.93		sreed@mvadiagnostics.com		12/31/2028	

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee STANDARDS					
CHAIR: Daniel Sauer		dmsauer@mtu.edu	(262) 896 - 2417		
Individual	Draft Guide for Evaluating Transformer Performance under Reverse Power Flow	Ryan Hogg		5/22/2024	Active PAR
PC57.133		rhogg@ieee.org		12/31/2028	
Individual	Draft Guide for the Evaluation of the Environmental Impact and Life Cycle Assessment of Transformers and Shunt Reactors			9/26/2024	Active PAR
PC57.151				12/31/2028	
C57.12.00	IEEE Standard for General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers	Eric Davis	2021	5/13/2022	ACTIVE - PAR for Revision
Individual		(816) 760 - 2627	12/31/2031		This standard is under continuous revision.
PC57.12.00		edavis@burnsmcd.com		12/31/2026	
C57.12.70	IEEE Standard For Standard Terminal Markings and Connections for Distribution and Power Transformers		2020		ACTIVE
Individual			12/31/2030		
C57.12.80	IEEE Standard Terminology for Power and Distribution Transformers		2024		ACTIVE
Individual			12/31/2034		
C57.12.90	IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers	Stephen Antosz	2021	5/13/2022	ACTIVE - PAR for Revision
Individual		(412) 498 - 3916	12/31/2031		This standard is under continuous revision
PC57.12.90		santos@ieee.org		12/31/2026	
C57.144	IEEE Guide for Metric Conversion of Transformer Standards		2004		INACTIVE-RESERVED
Individual			12/31/2020		This was to be incorporated into P947 but this project has been withdrawn. This needs to be reviewed in light of QUSCOM (formerly SCC14) documents.
C57.152	IEEE Guide for Diagnostic Field Testing of Fluid-Filled Power Transformers, Regulators, and Reactors	Marcos Ferreira	2013	6/13/2019	ACTIVE + PAR Revision + 1 PAR Extension
Individual		(971) 703 - 0777	12/31/2023		SA BALLOT: Closed on 10/4/2024 with 122 comments to resolve. Currently in Comment Resolution.
PC57.152		mdferreira@comcast.net		12/31/2025	

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD	Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE	Phone	Rev Due Date	PAR Expiration	Remark
PROJECT	Email			
SubCommittee STANDARDS				
CHAIR: Daniel Sauer	dmsauer@mtu.edu		(262) 896 - 2417	
C57.163	IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances	2023		ACTIVE
Individual		12/31/2033		

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee SUBSURFACE TRANSFORMERS & NETWORK PROTECTORS					
CHAIR: Tony Reiss		treiss@custommaterials.com		(440) 478 4471	
Individual	Draft Guide for Mitigating Corrosion on Subsurface Transformers and Network Protectors	William Elliott (318) 286-2868 will.elliott@alumni.lsu.edu		2/23/2022	Active PAR
PC57.12.53				12/31/2026	
C57.12.23	IEEE Standard for Submersible Single-Phase Transformers: 250 kVA and Smaller; High Voltage 34 500 GrdY/19 920 V and Below; Low Voltage 600 V and Below	Alan Traut (601) 422 - 1198 atraut@ieee.org	2018	2/5/2024	ACTIVE + PAR for Revision
Individual			12/31/2028		
PC57.12.23				12/31/2028	
C57.12.24	IEEE Standard for Submersible, Three-Phase Transformers, 3750 kVA and Smaller: High Voltage, 34 500 GrdY/19 920 Volts and Below; Low Voltage, 600 Volts and Below		2023		ACTIVE
Individual			12/31/2033		
C57.12.40	IEEE Standard for Network, Three-Phase Transformers, 2500 kVA and Smaller; High Voltage, 34 500 V and Below; Low Voltage, 600 V and Below; Subway and Vault Types (Liquid Immersed)		2024		ACTIVE
Individual			12/31/2034		
C57.12.44	IEEE Standard Requirements for Secondary Network Protectors		2024		ACTIVE
Individual			12/31/2034		
C57.12.57	IEEE Requirements for Ventilated Dry-Type Network Transformers 2500 kVA and Below, Three-Phase with High Voltage 34 500 Volts and Below, Low Voltage 216Y/125 and 480Y/125 Volts		1992		WITHDRAWN
Individual			12/31/2000		THIS STANDARD IS NO LONGER VALID. UNLESS IT IS REVISED IT WILL BE REMOVED FROM THIS REPORT.

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status	
BALLOT TYPE		Phone		Rev Due Date	PAR Expiration	Remark
PROJECT		Email				
SubCommittee TRANSFORMERS AND REACTORS FOR HVDC APPLICATIONS						
CHAIR:	Klaus Pointner	klaus.pointner@trench-group.com		43 732 - 6793		
Entity	Draft Guide for Vibration Testing of Oil-immersed High-voltage Direct Current (HVDC) Converter Transformer (± 160 kV dc to ± 1100 kV dc)	Dr Jun Deng		3/30/2023	ACTIVE PAR	TCR: Ulf Radbrandt
PC57.132		13822116195@139.com		12/31/2027		
1277	IEEE Standard General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors and for Dry-Type Converter Reactors for DC Power Transmission		2020		ACTIVE	
Individual			12/31/2030			
60076-57-129	IEC/IEEE International Standard - Power transformers--Part 57-129: Transformers for HVDC applications	Waldemar Ziomek	2017	2/15/2024	ACTIVE + PAR for Revision	
Individual		(204) 474 - 5739	12/31/2027			
PC60076-57-129		wziomek@ptitransformers.com		12/31/2028		

APPENDIX 3

CIGRE Liaison Report

CIGRÉ International Council on Large Electric Systems

Liaison Report on SCA2
Transformers for
IEEE Transformers
Committee- Spring 2025
Meeting

- Mar. 24, 2025



CIGRÉ Study Committees

SC A1: Rotating Electrical Machines

SC A2: Transformers

SC A3: High Voltage Equipment

SC B1: Insulated Cables

SC B2: Overhead Lines

SC B3: Substations

SC B4: HVDC and Power Electronics

SC B5: Protection and Automation

SC C1: System Development and Economics

SC C2: System Operation and Control

SC C3: System Environmental Performance

SC C4: System Technical Performance

SC C5: Electricity Markets and Regulation

SC C6: Distribution Systems and Dispersed Generation

SC D1: Materials and Emerging Test Techniques

SC D2: Information Systems and Telecommunication

SC A2 Recent Publications

- **Brochure 940:** Power Transformer Audible Sound Requirements (Sep. 2024)
- **Brochure 944:** Effects of DC Bias on Power Transformers (Nov. 2024)
- **Green Book 17:** Transformer and Reactor Life Management (Nov. 2024)

SC A2 WG Activities

No.	Working Group	Topic	Status
1	A2.56	Transformer Efficiency	Comment resolution
2	A2.58	Site Installation and Pre-commissioning of Power Transformers and Shunt Reactors	Active
3	A2.60	Dynamic Thermal Performance of Power Transformers	Active
4	A2.63	Transformer Impulse Testing	Active
5	A2/D2.65	Transformer Digital Twin- concept and future perspectives	Active
6	A2/D1.66	Breathing systems of liquid filled transformers and reactors	Active
7	A2.67	Guideline for Online Dissolved Gas Analysis Monitoring	Active
8	A2.68	Failure Survey of Lower Voltage Generator Step Up Transformers installed in Wind farms and Photovoltaic Parks	Active
9	A2.69	Guide for Transformer Maintenance	Active
10	A2.70	Life Cycle Assessment (LCA) of Transformers	Active

SC A2 WG Activities

No.	Working Group	Topic	Status
11	A2/D1.71	Modern Insulating Liquids Qualification for OLTC, Bushings and other accessories	Active
12	A2/D1.72	Retrofill of mineral oil in transformers - Motivations, Considerations and Guidance	Active
13	A2.73	Enhancing the exchange of Transformer information through digitalization	Starting
14	A2/D1.74	Online moisture monitoring of transformers for ageing assessment	Starting
15	D1/A2.77	Improved understanding of dynamic behavior of winding insulating materials in liquid insulated power transformers	Active
16	D1/A2.79	Improved understanding of dynamic behavior of winding insulating materials in liquid insulated power transformers	Active
17	D1/A2.80	Functional properties of non-metallic solid materials for liquid filled transformers and reactors and their compatibility with insulating liquids	Active

Upcoming New Working Groups

1. **A2/C4/D1.77 Design of Transformers for Very Fast Transient Overvoltages.**
Target completion Q3 2028.
2. **A2.75 Tap Changer Specification, Condition Assessment, Testing and Maintenance Guides.** Target completion Q2 2028.
3. **A2.76 Power Transformer Passive Protection Against Internal Arcing Faults.**
Target completion Q2 2027.
4. **A2.78 Bushing Diagnostics: Off-Line Testing and On-Line Monitoring Systems.**
Target completion Q1 2029.

If interested in contributing, please contact your appropriate CIGRÉ National Committee Representative.

TF and AG activities

- Task Force (TF): Power Transformers Sound Levels on Site
- Task Force (TF): Silver Corrosion in Transformers

Upcoming Events

- **CIGRÉ International Symposium**
 - Montreal, Quebec, Canada, Sep. 29-Oct. 2, 2025
 - Palais des Congrès de Montreal
 - Additional details at www.cigre.org
- **Advanced Research Workshop (ARWtr 2025)**
 - Baiona, Spain, Oct 12-15, 2025
 - Parador Royal Palace (CIGRÉ Spain, CIGRÉ Portugal)
 - Additional details at arwtr2025.webs.uvigo.es
- **CIGRÉ A2/D1 Study Committee Colloquium**
 - Seoul, S. Korea, Oct. 27-Nov. 1, 2025
 - Korea Chamber of Commerce and Industry
 - Paper preferential subjects:
 - Environmental Performance
 - Testing and Maintenance
 - Failure Prevention and Investigation
- **CIGRÉ USNC Grid of the Future**
 - Denver, CO, Nov. 10-13, 2025
 - Hosted by POWER Engineers
 - Hyatt Regency Denver
 - Additional details at www.cigre-usnc.org
- **CIGRÉ Paris Session 2026**
 - Paris, France, August 23-28, 2026
 - Palais des Congrès
 - Additional details to follow

IEEE Liaison Report

THANK YOU!



APPENDIX 4

IEC TC Liaison Report

IEEE Liaison Report

THANK YOU!





IEC Liaison Report

TC 14 Power Transformers

Chair: Christoph Ploetner, DE / Secretary: Stephany Lavy, UK

TC 10 Fluids for electrotechnical applications

Chair: Ivanka Hoehlein-Atanasova, DE / Secretary: Riccardo Maina, IT

TC 15 Solid electrical insulating materials

Chair: Lars Schmidt, DE / Secretary: Solomon Chiang, US

IEEE Transformers Committee Meeting
2025 March, Denver, CO, US



IEEE Transformers Subcommittee

IEC Technical Subcommittee

IEEE Transformers Subcommittee

IEC Technical Committee

1. Bushings (Scott Digby).....	SC 36A
2. Dielectric Tests (Poorvi Patel).....	TC 14
3. Distribution Transformers (Jerry Murphy).....	TC 14
4. Dry Type Transformers (David Walker).....	TC 14
5. Transformers and Reactors for HVDC Applications (Klaus Pointner)	TC 14
6. Instrument Transformers (David Wallace).....	TC 38
7. Insulating Fluids (Stephanye Mabrey).....	TC 10
8. Insulation Life (Sam Sharpless).....	TC 14 TC 15 TC 112
9. Performance Characteristics (Sanjib Som).....	TC 14
10. Power Transformers (Ryan Musgrove).....	TC 14
11. Standards (Dan Sauer).....	TC 14
12. Subsurface Transformers & Network Protectors (Clemens Reiss).....	TC 14



TC 14 General Information – Chris Ploetner

- Membership countries 52 (+3)
- Active experts 276
- Currently active MT, PT, WG, AG, AHG 10 + 3 joint groups
- Documents in charge of (TR, TS, IS) 40
- Documents under maintenance / in development 13 / 0
- **IEC/IEEE dual logo documents 6 (4 out of 6 in revision)**
- No documents published since last report
- Past Plenary Meetings
 - **2024, October 21st in Edinburgh (UK)**
- Next Plenary Meetings
 - **2025, Sept. 10th / 11th in New Delhi (India) // 2026, Sept. in Hamburg (DE)**



Revision of TC 14 documents in progress (12)

1. IEC 60076-1 General – CDV to be published in Q4
2. IEC 60076-2 Thermal performance measurement and test procedures for liquid-immersed transformers – CDV to be published in Q4
3. IEC 60076-4 Lightning impulse and switching impulse tests of power transformers and reactors – FDIS to be published in Q2
4. IEC 60076-5 Ability to withstand short circuit – CDV to be published in Q2
5. IEC 60076-6 Reactors – CDV to be published in Q2
6. IEC 60076-9 Terminal and tapping markings – CD in Q2 expected
7. IEC 60076-18 Measurement of frequency response – work in progress
8. IEC 60076-19-2 Uncertainties in the measurement of reactor losses – CD in Q4
9. IEC 62032 / IEEE C57.135 Technical guideline for the Application, Specification, and Testing of Phase-Shifting Transformers
>> to become IEC/IEEE 60076-57-135 – work ongoing
10. IEC/IEEE 60076-57-1202 Liquid-immersed phase-shifting transformers ----“-----
11. IEC/IEEE 60076-57-129 HVDC Converter Transformers – WG meets Thu / Fri
12. IEC 60076-21 / IEEE C57.15 Step-voltage regulators – WG meets on Thursday
13. IEC 60076-26 Functional requirements of insulating liquids for use in power transformers (jointly with TC 10) – work ongoing

IEEE / IEC
Chair / Convener

E. Schweiger /
K. Juchem

W. Ziomek /
F. Trautmann

D. Sauer /
D. Sauer



TC 10 General Information – Ed Casserly

- **42** Member countries; **8** Active MT, PT, WG, AG, JMT; **214** Experts
- **63** Documents under supervision; **7** Documents in revision / development
- **4 Document published since last report (1 at FDIS stage):**
 - IEC 60156:2025 IEC 61039:2025
 - IEC 62770:2024 IEC 63360:2025
- Last plenary meeting, 2024 April 18/19 Rome (IT) – jointly with TC 14
 - Hybrid meeting – 84 participants (48 in-person) - 4 USNC TAG members
- **Next plenary meeting, Sept. 10-11, 2025 New Delhi (India)** – jointly with TC 14
 - Hybrid meeting



TC 10 Standards Currently Under Revision

For details see TC 10 webpage

- MT24 (Ivanka Höhlelein-Atanasova, DE)
 - **In maintenance** – 61619 ED2: Insulating liquids - Contamination by polychlorinated biphenyls (PCBs) - Method of determination by capillary column gas chromatography (Riccardo Maina, IT)
 - **In maintenance** – 61198 ED2: Mineral insulating oils - Methods for the **determination of 2-furfural** and related compounds (Riccardo Maina, IT)
 - **In maintenance** – 60814 ED2: Insulating liquids - Oil-impregnated paper and pressboard - Determination of water by automatic coulometric Karl Fischer titration (Senja Leivo, FI)
- MT30 (Massimo Pompili, IT)
 - **In maintenance** – 60897 ED2: Methods for the determination of the lightning breakdown voltage of insulating liquids
- MT36 (Attila Györe, HU)
 - **FDIS - 61203 ED2: Synthetic organic esters - Guide** for maintenance of transformer esters
 - **In maintenance** – 61099 ED3: Insulating liquids - Specifications for unused synthetic organic esters for electrical purposes



TC 10 Standards Currently Under Revision

For details see TC 10 webpage

- MT43 (Griffin Burk, US)
 - **CD** - 60666 ED3: Detection and determination of specified **additives in mineral insulating oils**
- WG41 (Yannick Kieffel, FR)
 - **CDV** – 63359 ED1: Fluids for electrotechnical application: Specifications for the re-use of mixtures of gases alternative to SF₆
- WG45 (Ivanka Höhlelein-Atanasova, DE)
 - **CDV** - 63585 ED1: Interpretation of **DGA analysis in natural and synthetic esters**



Partially concurrent
with ASTM D27.03

New TC 10 Standard in Development

- WG46 (Yihua Qian, CN)
 - **Retro-filling** mineral oil immersed transformers **with alternative insulating liquids**



TC 15 General Information – Solomon Chiang

Scope: Solid electrical insulating materials incl. coatings and varnishes

- **39** Member countries (20 P members); **10** MT, PT, WG; **92** Experts dealing with
 - plastic films, combined flexible materials, mica products, pressboard and related material, cellulosic paper products, flexible insulating sleeving, rigid fibrous reinforced laminates, resins and varnishes
- **231 Publications --- 22 active projects** (revision/development)
- **12 Documents published since 2023** – for details see TC 15 webpage
- **Last plenary meeting, Nov 11 - 14, 2024, Vienna, Austria**
 - In Person Meeting – 26 participants - **2 USNC TAG representatives**
- **Next in-person plenary meeting, October 20 - 23, Tokyo, Japan**



TC 15 Projects of interest to the IEEE Transformers Committee

MT 14 – **Pressboard** and related material – IEC 60641-x-y documents

MT 15 – **Cellulosic paper products** – IEC 60554-x-y documents

Due to common characteristics of **Pressboard** and **cellulosic paper products**, TC 15 is considering merging MT-14 and MT-15 – given the decision a 2-year time frame

New document in development

IEC 60554-3-6 – Specification for cellulosic papers for electrical purposes -

Part 3: Specifications for individual materials -

Sheet 6: Presspaper



TC 15 Projects of interest to the IEEE Transformers Committee

TC15 – WG-7 received approval to revise IEC 61033
*This is an old document **requiring an update.***

Project

IEC 61033 ED2

Test methods for the determination of bond strength of impregnating agents to an enameled wire substrate

Detail

Committee	Working Groups	Project Leader	Current Status
TC 15	WG 7	Mr Mark Winkeler	ACD

APPENDIX 5

Standards Coordinating Committee No. 4

Standards Committee 04 (SC04)

Evanne Wang for Dr. Nancy Frost

IEEE/PES Transformers Committee

March 24, 2025

Denver, CO

Scope

- *Standards Committee 04 oversees development of standards for Electrical Insulation that span the scope of multiple Technical Committees and Societies (e.g., Dielectric and Electrical Insulation, and Power Engineering) within IEEE. Reporting to IEEE PES Transformers Committee as well as IEEE SESCom.*
- **Scope:**
 - To formulate guiding principles for the evaluation of insulation materials and systems for electrical and electronic applications.
 - To formulate principles for the identification of insulation materials and systems based on functional tests and/or experience.
 - To coordinate the preparation of standards for functional test programs and diagnostic methods for the evaluation of insulation materials and systems.

Standards

- **IEEE 1-2000 (R2011)** Recommended Practice – General Temperature Limits in the Rating of Electrical Equipment and for the Evaluation of Electrical Insulation
- **IEEE 98-2016** Standard for the Preparation of Test Procedures for the Thermal Evaluation of Solid Electrical Insulating Materials
- **IEEE 99-2019** Recommended Practice for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment

Current Activities

- **IEEE 1** - Standard expired 12/31/2021. Current PAR was extended to 12/31/2026, as the standard is in the ballot process. The ballot closed 02/20/2025, with 119 votes. The leadership is scheduling comment resolution meetings to start mid-March.

Join us: IEEE 1 Chair – Brad Greaves (brad.greaves@weidmann-group.com)

- **IEEE 98** - This standard is the next in the series to be revised. Interest from other standards that utilized IEEE 98 is being gathered from IEEE PES as well a IEEE NPE, in an effort to be more seamless and proactive in potential updates to the standard. It is anticipated to initiate work on this standard in 2025.

Join us: SC04 Chair - Nancy Frost (DrNancyFrost@gmail.com)

- **IEEE 99** - Revisions to this standard are on hold until IEEE 98 is completed.
- **SC04 membership** - SC04 roster has had several expert retirements. If you have interest and are knowledgeable in this area, please contact the SC04 chair.

Join us: SC04 Chair - Nancy Frost (DrNancyFrost@gmail.com)

Participate

- SC04 Chair – Nancy Frost (DrNancyFrost@gmail.com)
- IEEE 1 Chair – Brad Greaves (brad.greaves@weidmann-group.com)

APPENDIX 6

ASTM

ASTM Committee D27

Electrical Insulating Liquids and Gases

Liaison Report

Ed Casserly

IEEE/PES Transformers Committee

March 24, 2025

Denver

Committee D27 on Electrical Insulating Liquids and Gases

ASTM Committee D27 on Electrical Insulating Liquids and Gases was formed in 1959. D27 meets twice each year, in May and November, with about 30 members participating in 12 meetings over two days. The Committee, with a membership of approximately 120 members, currently has jurisdiction of over 50 approved standards that are published in the Annual Book of ASTM Standards, Volume 10.03.

Committee Officers

Chairman: Lance Lewand
Vice-chairman: Edward Casserly
Secretary: Michael Bonn

Meetings

Last Meeting: Nov 11-12, 2024
Orlando, FL
Next Meeting: May 5-6, 2025
Toronto, CA

D27 Committee Membership

Classification	Official	Non-Official	Total
Producer (Liquid/Gas)	22	15	37
<u>User (OEM/Utilities)</u>	<u>13</u>	<u>1</u>	<u>14</u>
General Interest (Labs)	44	23	67
Total	79	39	118

- Organized by company, organization, or individual
- 1 official vote per company, organization, or individual**
- Unanimous approvals** – all negatives must be resolved, even from non-voting members
- Need the voice of transformer OEMs and utilities**

ASTM D27 Mineral Insulating Liquids

D27.01 - Mineral Oils, Griffin Burk:

1. ASTM D8180-23 - **Specification for Re-refined Mineral Insulating Liquid** Used in Electrical Apparatus, approved Jan 1, 2023.
2. ASTM D5222-23 – Specification for Less Flammable High Molecular Weight Hydrocarbon Mineral Electrical Insulating Liquids, approved January 1, 2023.
 - **New title**, previously, “High Fire Point Mineral Electrical Insulating Oils”
3. ASTM D3487-24 – **Specification for Mineral Insulating Oil** Used in Electrical Apparatus, approved June 1, 2024.

ASTM D27 Ester Insulating Liquids

D27.02 - Gases and Non-Mineral Oil Liquids, Todd Felton:

1. **ASTM D8240-22** Specification for Less-Flammable Synthetic Ester Liquids Used in Electrical Apparatus (IEC 61099), **approved August, 2022**.
 - Requires disclosure of additives.
2. **ASTM D6871-17** Specification for Natural (Vegetable Oil) Ester Fluids Used in Electrical Apparatus.
 - Currently under revision, WK81903
 - Expected to include disclosure requirement consistent with D8240 and IEC Standards

ASTM D27 Analysis of Additives

D27.03 - Analytical Tests, Claude Beauchemin:

1. **WK81449** New Standard For the determination of additives in insulating liquids - Part 1 - Determination of phenolic antioxidants using liquid chromatography (LC)
 - (Technical Contact: Casserly, Edward W)
2. Work is on-going. Part 1 is on the determination of phenolic antioxidants using liquid chromatography (LC) and a draft has been issued.
 - [Concurrent with IEC TC10 MT43 revision of 60666.](#)

ASTM D27 Corrosive Sulfur

D27.06 – Chemical Tests, Lance Lewand:

1. **ASTM D1275-24** Corrosive Sulfur in Electrical Insulating Liquids
 - (Technical Contact: Lewand, Lance)
 - [Will be reopened to address Silver Corrosion concerns](#)

ASTM D27 Future Work

D27.15 - Planning, Resources and Development, Kevin Wirtz:

1. WK68133 – Oxidation Stability of Natural and Synthetic Ester Liquids using OIT by DSC – submitted for development to D27.06 SC. Current draft to be posted to collaboration site is v11.
2. Oxidation of Natural Ester Liquids using Non-DSC Methods – L. Lewand
Working on use of D2112 to assess.
3. Partial Discharge – Dominique Bolliger (in cooperation with IEC TC10 MT30)
4. Relative Saturation of Water in Insulating Liquids – Lance Lewand

APPENDIX 7

Transactions Power Delivery



Transactions on Power and Delivery (TPWRD) Editor Liaison Report IEEE PES Transformer Committee

**March 24, 2025– Spring Meeting,
Denver, CO**

Xose Lopez-Fernandez



IEEE PES TRANSFORMERS COMMITTEE
Spring 2025 Meeting: Denver, Colorado USA October 23– 27, 2025

Editor’s Report (16.03.2025)
Xose LOPEZ-FERNANDEZ

IEEE TRANSACTIONS ON
POWER DELIVERY



IEEE POWER & ENERGY SOCIETY
Power & Energy Society*

OCTOBER 2024

VOLUME 39

NUMBER 5

ITPDE5

(ISSN 0885-8977)

During 2024 until March 16, 2025, a total of 119 papers were and are in the editorial review in the transformer area of IEEE Transactions on Power Delivery for possible publication. For all of these papers the recommendations were as follows:

Accept	18
Revise & Resubmit	10
Under review	13
Reject ..	64
Editorial / Administrative Reject	14
TOTAL (During 2024 until March 16, 2025)	119
The above numbers include reviews managed by all editors.	





IEEE PES TRANSFORMERS COMMITTEE

Spring 2025 Meeting: Denver, Colorado USA October 23– 27, 2025

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IEEE TRANSACTIONS ON POWER DELIVERY



IEEE POWER & ENERGY SOCIETY

OCTOBER 2024

VOLUME 39

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(ISSN 0885-8977)

The papers accepted for publication are shown below:

DOI /Accepted	Title / Accepted
10.1109/TPWRD.2025.3544827	Implementation of the State-Space Power Transformer Model in ATP for High Frequency Transient Studies
10.1109/TPWRD.2025.3535497	Energy Estimation Method for Power-frequency Arc in Transformer Oil Based on Gap Length and Pressure
10.1109/TPWRD.2025.3535419	Multi-Winding Power Transformer Modeling for Fast-Front Transients
10.1109/TPWRD.2024.3486293	Mechanism of deterioration of oil immersed louver contact on valve side of UHV converter Transformer
10.1109/TPWRD.2024.3504961	On Analytical Estimation of Inductances in Equivalent Ladder Network Model of a Homogeneous Transformer Winding Using FRA Data
10.1109/TPWRD.2024.3474013	Analyzing the Effects of Lightning Strike on Distribution Transformer Failure via Geographically and Temporally Weighted Regression
10.1109/TPWRD.2024.3458804	A Flux Matching Method for Mitigating the Inrush Current of Single-Phase Power Transformers



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DOI /Accepted	Title / Accepted
10.1109/TPWRD.2024.3495556	Parametric Evaluation for Comprehensive Fault Analysis in an Isolated HV-LV Winding Assembly Using Composite Frequency Response
10.1109/TPWRD.2024.3495229	Investigation of Liquid Temperatures and Velocities at Winding Inlet in Natural Cooled Transformers through Complete-Cooling-Loop based CFD Simulations and Experiments
10.1109/TPWRD.2024.3485090	Converter Embedded Testing of Inter-laminar Core Insulation of Step-up Transformers for Wind Energy Applications
10.1109/TPWRD.2024.3502642	Geomagnetically Induced Current Field Test on Large Grid-Connected Power Transformers: Analysis, Model Development, and Simulations
10.1109/TPWRD.2024.3466297	Application of Dynamic Detailed Thermal Hydraulic Model on a Transformer with zig-zag winding scale model
10.1109/TPWRD.2024.3453270	Perturbation-Based Load Sensitivity Identification for Smart Transformer-based Load Control



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DOI /Accepted	Title / Accepted
10.1109/TPWRD.2025.3528121	Transformer Incremental Fault Diagnosis Method Using Lossless Estimation and Balanced Training
10.1109/TPWRD.2024.3502638	Lifetime Improvement of Liquid-Immersed Power Transformers based on Novel Nanofluids and Water Scavenger
10.1109/TPWRD.2024.3389025	Incident Analysis of Excessive Acetylene from a 1000 kV Shunt Reactor due to Transient Operations
10.1109/TPWRD.2024.3474420	Detection of On-Load Tap-Changer Contact Wear Using Vibroacoustic Measurements
10.1109/TPWRD.2024.3454230	A Novel Graphical Method for Interpretating Dissolved Gases and Fault Diagnosis in Power Transformer Based on Dynamique Axes in Circular Form



IEEE PES TRANSFORMERS COMMITTEE

Spring 2025 Meeting: Denver, Colorado USA October 23– 27, 2025

Editor's Report (16.03.2025)

Xose LOPEZ-FERNANDEZ

IEEE TRANSACTIONS ON POWER DELIVERY



IEEE POWER & ENERGY SOCIETY

OCTOBER 2024

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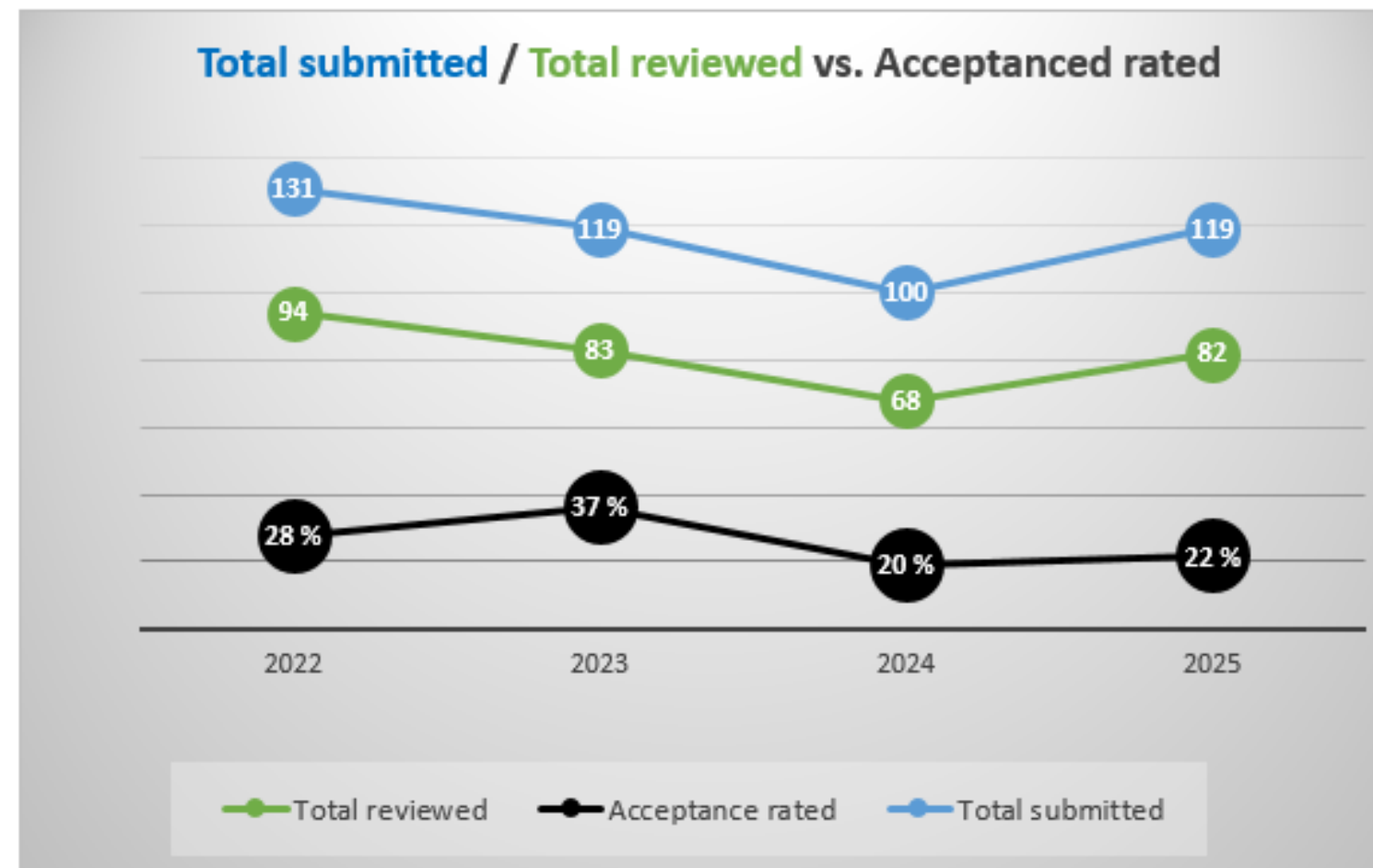
ITPDE5

(ISSN 0885-8977)



Trends (2022–2025)

The graph shows the evolution of **total submitted** papers to IEEE Transactions on Power Delivery in the transformer area, compared to the number of **reviewed** papers and the **acceptance** rate from Spring 2022 to Spring 2025.



IEEE PES TRANSFORMERS COMMITTEE

Spring 2025 Meeting: Denver, Colorado USA October 23– 27, 2025

Editor's Report (16.03.2025)

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IEEE TRANSACTIONS ON **POWER DELIVERY**



IEEE POWER & ENERGY SOCIETY

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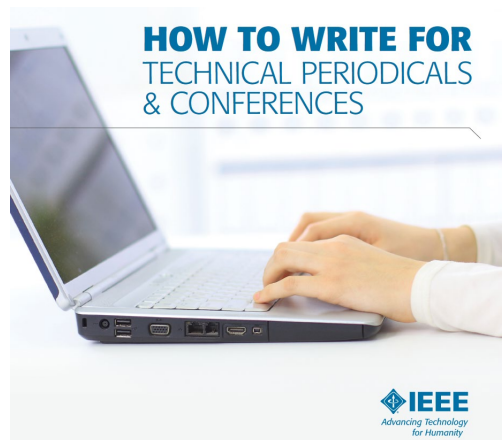
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Author Recommendation and Call for reviewers



It is important for all interested individuals to adhere to the guidelines for writing papers as provided by IEEE. Detailed information can be found at the following link: <https://cmte.ieee.org/tpwrdr>. In particular, the resource “How to Write for Technical Periodicals and Conferences” is highly recommended:

https://eps.ieee.org/images/files/mc-ieee_author_guide_interactive.pdf

All individuals involved in IEEE Transformers Committee activities are courage to consider joining as reviewers. Those interested can send an email to xmlopez@ieee.org, specifying their “Specialty / Area of Expertise” of interest, such as:

- Power Transformers
- Instrument Transformers
- Insulating fluids category
- Insulation life
- Audible Noise and Vibration
- Transformer Modeling Techniques
- HVDC Converter Transformers
- Reactors
- Monitoring
- Design
- Heating
- Etc

APPENDIX 8

IEEE Staff Update Presentation

PES TRANSFORMERS COMMITTEE SPRING MEETING

PES TRANSFORMERS ADMINISTRATIVE SUBCOMMITTEE SPRING 2025

PATRYCJA JAROSZ

P.JAROSZ@IEEE.ORG

DENVER, CO

MARCH 2025

IEEE STANDARDS ASSOCIATION

IEEE SA UPDATES

- ☐ Summary of Updates
- ☐ PAR/Standards Status Update, Entity PARs Status, EPM Update, IEEE/IEC Update
- ☐ Status of SC P&P
- ☐ DGA database updates
- ☐ IEEE SA and Standards Council of Canada (SCC)
- ☐ Annex : Past policy updates



SUMMARY OF UPDATES FROM IEEE SA

- ❑ **WG chairs to complete: Understanding IEEE SA's Antitrust, Competition, and Commercial Terms Policies**
 - ❑ Training has moved to the volunteer ILN site (<https://volunteers.iln.ieee.org/>).
 - ❑ IEEE SA Staff will reach out to you via email if you have not completed the training.
- ❑ **Reminder to email the WG Membership Roster to your PM for Standards Development WGs**
 - ❑ The membership list should include - Last Name, First Name, email address and Membership Status (Voting/Non-Member)
 - ❑ IEEE SA Staff will reach out to WG Officers if MyProject Roster has not yet been submitted.
- ❑ **WG Awards are now submitted in myProject, a WG roster is necessary to complete the awards submission.**
 - ❑ Phone numbers and addresses for the recipients are now required
Phone numbers for the recipients is now required

IEEE-SA UPDATES – PAR/STANDARDS STATUS

2025 – 16 PARS are expiring

- ☐ P65700-19-03 (waiting on FDIS)
- ☐ PC57.93a (March Revcom and Nescom agenda)
- ☐ PC57.124 (invitation ballot needs to be re-initiated)
- ☐ Comment resolution Stage: PC57.19.100, PC57.16, PC57.96, PC57.162, PC57.91, PC57.13.9, PC57.142, PC57.170, PC57.152
- ☐ Draft stage: P637, PC57.155, PC57.141, PC57.125

2026 – 18 PARS are expiring

- ☐ 5 PARs in SA Ballot stage
 - ☐ PC57.166, PC57.98, PC57.146, PC57.94, P1276a
- ☐ 13 in WG development stage

Expiring Standards in 2025

- ☐ 12 Standards will become inactive
 - ☐ PC57.12.37, PC57.12.59, PC57.94, PC57.139, PC57.637, PC57.130, PC57.32, PC57.32a, PC57.157, PC57.125, PC57.153, PC57.106 (does not have an active PAR)

Expiring Standards in 2026

- ☐ 5 Standards will become inactive
 - ☐ PC57.13, PC57.138, PC57.156, PC57.159, P60076-57-1202



IEEE-SA UPDATES – ENTITY PAR STATUS

Entity PARs

- ❑ **PC57.32.10-** Guide for the Selection of Neutral-point Insulation Grade and Grounding Reactor of Converter Transformers in HVDC Transmission
 - ❑ *Approved by Revcom on February 12, 2025- still in the publishing stage*
- ❑ **PC57.93a-** Draft Guide for Installation and Maintenance of Liquid-Immersed Power Transformers
 - ❑ *On March 26, 2025 Revcom Agenda and Nescom Agenda (modified PAR submission)*
- ❑ **PC57.141-** Guide for Detection, Monitoring, and Evaluation of Winding Deformation in Liquid-Immersed Power Transformers
 - ❑ *In March 2025, WG is voting for approval to go to ballot and will reach out to SubCom Chair before the Wednesday meeting to ask for SubCom approval to go to ballot*
- ❑ **PC57.13.10-** Guide for Calibration of Energized Current Transformers for 34.5 kV and Below
 - ❑ *WG has approved to go to ballot and have reached out to SubCom Chair to get SubCom approval to go to ballot during the Spring meeting*
- ❑ **PC57.132-** Guide for Vibration Testing of Oil-immersed High-voltage Direct Current (HVDC) Converter Transformer (± 160 kV dc to ± 1100 kV dc) (EPM)
 - ❑ *WG will have its next meeting in Sweden in August, 2025*
- ❑ **PC57.145-** Guide for Digital Twin Modeling and Analysis of Power Transformers with High Voltages Greater than or Equal to 69 kV up to and Including 161 kV (EPM)
 - ❑ *WG is working on draft and is having a meeting in March 2025*
- ❑ **PC57.20-** Guide for Power Transformers for Low-frequency (10 Hz to 30 Hz) Power Transmission (EPM)
 - ❑ *WG had 2nd meeting March 19, 2025. Feedback was provided with comments. It looks like a PAR modification will be needed update the title to “liquid filled.” This will be discussed more at next WG meeting.*
- ❑ **PC57.12.210-** Recommended Practice for On-load Capacity Switching Distribution Transformers
 - ❑ *Approved at the September 25th, 2024 Revcom Meeting and published*

IEEE-SA UPDATES – EPM STATUS

Pending EPM PARS

- ❑ **P0106:** Guide for General Technical Requirements and Test Methods for Converter Valve Anode Saturation Reactor in $\pm 500\text{kV}$ High Voltage Direct Current Transmission System
- ❑ **P0136:** Recommended Practice for Acoustic Fingerprint-Based Online Monitoring Systems in Substation Equipment
- ❑ **P0137:** Guide for composite current switching test of vacuum-type on load tap changer for converter transformer
- ❑ **P0148:** Guide for arc test of liquid-Immersed High-Voltage Direct-Current (HVDC) converter transformers
- ❑ **P0161:** Recommended Practice for Testing the Impact of Harmonic Distortion on the Transformers of a nominal voltage of 10kV and less
- ❑ **P0173:** Guide for Technical Specification of Smart Distribution Transformer Terminal
- ❑ **P0184:** Guide for measurement of the polymerization degree of insulating paper/paperboard for power transformers based on terahertz time domain spectroscopy
- ❑ **P0197:** Guide for Inversion Detection of Hot-spot Temperature and Loading Capacity in Oil-immersed Transformer
- ❑ **P0203:** Recommended Practice for Inspection of Oil-Filled Equipment in Substation
- ❑ **P0217:** Guide for Identification and Analysis of Noise Contribution from Large-scale Power Facilities to the Surrounding Environmental Noise
- ❑ **P0230:** Guide for testing partial discharge acoustic imaging of electric power equipment

IEEE/IEC DUAL LOGO UPDATE (PUBLISHED STANDARDS)

Joint Development of standards with IEC

Published Standards

- ❑ **IEC/IEEE P65700-19-03-2014:** Standard Requirements, Terminology, and Test Code for Bushings for DC Applications Rated 110 kV BIL and Above
- ❑ **IEC/IEEE P60076-57-1202-2016:** Standard Requirements for Liquid Immersed Phase-Shifting Transformers
- ❑ **IEC/IEEE P60076-57-129-2017:** Converter Transformers for HVDC Applications
- ❑ **IEC/IEEE P60076-16-2018:** Standard Requirements for Wind Turbine Generator Transformers
- ❑ **IEEE PC57.15/IEC 60076-2017:** Guide for the Application, Specification and Testing of Phase-Shifting Transformers
- ❑ **IEEE/IEC P63253-5713-8-2024:** Standard Requirements for Station Service Voltage Transformers

IEEE/IEC DUAL LOGO UPDATE (ACTIVE PROJECTS)

Standards Under Development

- ❑ **IEEE/IEC P65700-19-03:** Standard - Bushings for DC Application
 - ❑ PAR for the revision was approved September 2021 and expires December 31, 2025
 - ❑ Recirculation was done with FDIS draft and we are waiting for IEC to complete their FDIS ballot
- ❑ **IEEE/IEC PC57.15:** Standard- Power transformers - Part 21: Standard requirements, terminology, and test code for step-voltage regulators
 - ❑ PAR for the revision was approved February 2024 and will expire December 31, 2028
 - ❑ Draft development
- ❑ **IEEE/IEC P60076-57-129:** Standard - Power transformers--Part 57-129: Transformers for HVDC applications
 - ❑ PAR for the revision was approved February 2024 and will expire December 31, 2028
 - ❑ Draft development
- ❑ **IEEE/IEC P60076-57-1202:** Standard Power Transformers Part 57-1202: Liquid immersed phase-shifting transformers
 - ❑ PAR for the revision was approved September 2024 and will expire December 31, 2028
 - ❑ Draft development
- ❑ **IEEE/IEC P63253-5713-8-2024/Cor 1:** Standard- Station Service Voltage Transformers (SSVT)- Corrigendum 1
 - ❑ On the May 7, 2025 Nescom Agenda
 - ❑ Chair has been made aware that he needs to reach out to IEC to get written approval to move forward
 - ❑ Chair will also be asking the Subcommittee for approval

PE/TR STDS COMM. P&PS 2025 UPDATE

AudCom Baselines URL

- ☐ The Audcom Reviewers recently uploaded the updated checklist on March 17, 2025 and marked it for “acceptance.”
- ☐ The Transformers Standards Committee P&P should be accepted at the March 25, 2025 Audcom Meeting.
- ☐ Once the official approval comes through, you will receive an email from the Audcom Administrator confirming the approval.

- ☐ The SC will now need to work on the Individual and Entity WG P&Ps and get SC approval. After the WG P&Ps are approved, one of them will need to be submitted to the Audcom Administrator. Please send either the Individual or Entity P&P to Patrycja and it will be forwarded to the Audcom Administrator.

DGA DATABASE UPDATES

- ☐ **PC57.139- Chair confirmed WG is done collecting data**
- ☐ **PC57.155- Chair confirmed they will soon be getting an update to a dataset that is essential to the Standard; they are still collecting information**
- ☐ **PC57.130- IEEE SA staff that handles the DGA database configuration reached out that the WG will not be able to continue using the database to collect information at this time as their survey does not follow the template that the DGA supports.**
- ☐ **PC57.104- Chair has met with IEEE SA staff that handles DGA and the Staff has confirmed the formatting of the survey will work. The WG can therefore use the DGA database. The Survey email and survey have been sent for legal review. The WG hopes to send out the Survey in April after the legal review is complete.**

IEEE SA AND STANDARDS COUNCIL OF CANADA (SCC)

IEEE Standards Association (IEEE SA) recently earned accreditation from the Standards Council of Canada (SCC) to develop National Standards of Canada.

- ☐ As an SCC-accredited SDO, IEEE SA can submit standards to SCC for acceptance as National Standards of Canada
- ☐ Currently, within Canada several IEEE standards related to energy efficiency and renewable electricity are already referenced in regulations.
- ☐ The Canadian Electrical Code also references 20 IEEE standards.

Next Steps

- ☐ **WGs PC57.104 and PC57.156 are the ones that were submitted to the SCC.**
 - ☐ IEEE SA submitted NOI's (Notice of Intent) for both of these WGs
 - ☐ This is the first step in the SCC process, where they let the public know about the project to get an influx of interest.

QUESTIONS?



PAST POLICY CHANGES AND UPDATES

STAFF UPDATE

Patrycja	
Bushings	Dry Type
HVDC	Power Transformers
Insulation Life	Distribution
Instrumentation	Dielectric
Performance Characteristics	Insulation Fluids
Standards	
STNP	

PRESENTING OF PATENT, COPYRIGHT AND BEHAVIORAL SLIDES DURING MEETINGS

Patent Slides

- Based on Clause 6.3.2 in the *IEEE SA Standards Board Operations Manual* the Patent Slides shall be presented at every Standards Development meeting once there is an approved PAR.

6.3.2 Call for patents

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IEEE SA STANDARDS BOARD OPERATIONS MANUAL

2024

The chair or the chair's delegate of an IEEE standards-developing working group or the chair of a Standards Committee shall be responsible for informing the participants at a meeting that if any individual believes that Patent Claims might be Essential Patent Claims, that fact should be made known to the entire working group and duly recorded in the minutes of the working group meeting. This request shall occur at every standards-developing meeting once the PAR is approved by the IEEE SA Standards Board.

The chair or the chair's delegate shall ask any patent holder or patent applicant of a Patent Claim that might be or become an Essential Patent Claim to complete and submit a Letter of Assurance in accordance with Clause 6 of the *IEEE SA Standards Board Bylaws*. Information about the draft standard will be made available upon request.

PRESENTING OF PATENT, COPYRIGHT AND BEHAVIORAL SLIDES DURING MEETINGS

Copyright Slides

- Based on Clause 6.1 in the *IEEE SA Standards Board Operations Manual* the Copyright Slides can be either presented at every meeting or distributed prior to the meeting along with the meeting agenda. If slides are distributed before the meeting, all participants will be informed at the beginning of the meeting that the slides were shared prior to the meeting. The presentation of the slides or the prior notice to participants shall be noted in the meeting minutes.

6.1 Copyright

IEEE owns the copyright of draft IEEE standards and approved IEEE standards (see 7.2 of the *IEEE SA Standards Board Bylaws*).

Contributions made by participants in an IEEE SA standards development meeting, whether the Contributions are Published or not, are subject to the IEEE SA Copyright Policy set forth in Clause 7 of the *IEEE SA Standards Board Bylaws*.

The IEEE SA Copyright slide shall be either presented at the beginning of every IEEE SA standards development meeting, or distributed prior to the meeting along with the meeting agenda. If the slide is distributed with the meeting agenda, all meeting participants shall be informed at the beginning of the meeting that all material submitted during the meeting is a Contribution and is subject to the IEEE SA copyright policy. The presentation of the slide or the notice to meeting participants shall be documented in the minutes of the meeting.

PRESENTING OF PATENT, COPYRIGHT AND BEHAVIORAL SLIDES DURING MEETINGS

Behavioral Slides for Individual & Entity Working Groups

- ❑ Based on Clause 5.3.3 in the *IEEE SA Standards Board Operations Manual* the Behavioral Slides can be either presented at every meeting or distributed prior to the meeting along with the meeting agenda. If slides are distributed before the meeting, all participants will be informed at the beginning of the meeting that the slides were shared prior to the meeting. The presentation of the slides or the prior notice to participants shall be noted in the meeting minutes.

5.3.3 Standards development meetings

Standards development meetings are to be conducted consistent with the principles of fairness and openness, and without dominance.

The IEEE SA Individual method or Entity method participant behavior slide set, as applicable, shall be either presented at the beginning of every IEEE SA standards development meeting or distributed prior to the meeting along with the meeting agenda. If the slides are distributed with the meeting agenda, all meeting participants shall be informed at the beginning of the meeting that participant behavior shall comply with the outlined requirements. The presentation of the slides or the notice to meeting participants shall be documented in the minutes of the meeting.

UPCOMING POLICY ON TAXES & MEETING EXPENSES (CONFERENCE SERVICES)

- ❑ Standard Committees or Working Groups shall collect as part of standards development meeting fees any applicable indirect and direct tax payments for the meetings.
- ❑ IEEE SA policies and procedures have been updated to reflect the requirement for payment of taxes associated with IEEE SA meeting fees (see subclause 5.3.5 of the *IEEE SA Standards Board Operations Manual*). IEEE SA has set up an alias (sa-mtg-tax@ieee.org) to help IEEE SA Standards Committees (SCs) and Working Groups (WGs) who charge meeting fees to coordinate payment of applicable taxes (this applies anywhere in the world, including within the US).
- ❑ Note that IEEE intends to roll out automation of a tax engine in some of its systems. One system will be IEEE Cvent, which is managed by IEEE CEE. This rollout is expected within 1 to 2 years. IEEE SA strongly recommends that IEEE SA groups that charge meeting fees transition to using Cvent for meeting registrations once Cvent is rolled out.

ETool: Listserv

IEEE ListServ is the email list management tool for Working Group (WG) email communication. Through this list, the WG can communicate with individuals interested in the WG activities.

- ☐ The ListServ provides an email alias that can be used by the WG.
- ☐ There can be an email list for WG members only and another email list to be used for all others that have an interest in the WG activities.
- ☐ **Please contact Patrycja for assistance if there is interest in setting up a GDPR compliant IEEE ListServ email list. Please specify if the ListServ will be a WG only or Public ListServ.**
- ☐ Participants must be notified that they have been added to the ListServ.
- ☐ A Welcome Email via the ListServ must be sent (Patrycja will provide the template to WG Officers) to the participants on the ListServ and for the participants to be provided the option to opt out of receiving emails if they chose to do so.
- ☐ WG Officers maintain the ListServ and are provided with Administrator access.



ENTITY PARTICIPATION UPDATES

Previous Entity Participation:

- ☐ Can observe one meeting to see if interested in joining as a Corporate Member
- ☐ Corporate membership is needed to gain access to materials and participate."

Current Changes:

- ☐ Entity nonmembers may observe any Entity WG Meeting(s)
- ☐ At the discretion of the WG Chair
- ☐ Entity nonmembers may be able to speak
- ☐ Entity nonmembers may have read-only access to meeting materials

Update: Note – IEEE SA no longer provides Basic and Advanced Corporate Membership options. There is only a single IEEE SA corporate membership.



STANDARDS COMMITTEE REPRESENTATIVE & DRAFT DISTRIBUTION

- ❑ Availability of the Entity draft for the [Public Review Process](#) comments being readily available to the Standards Committee overseeing the project.
- ❑ The SCR (Standards Committee Representative) who has access to the draft is able to *share it with those in the Standards Committee with an interest* in the project.
- ❑ There is no cost associated with this. We have created the below FAQ to have guidance for the SCR. <https://standards.ieee.org/faqs/share/>

Can the Standards Committee Representative of an entity-based Working Group share the draft with participants in its Standards Committee?

Yes, the Standards Committee Representative should share the draft(s) with a subgroup of identified participants that have an interest in the scope of the Working Group within the Standards Committee.

REQUEST FOR IEC STANDARDS (NEW PROCESS)

- ❑ IEEE SA Working Groups (WGs) that wish to obtain IEC documents first must utilize the IEC [Products & Services Portal \(iec.ch\)](http://iec.ch) website.
 - ❑ A lot of information is already available for all IEC deliverables (concerned IEC TC, scope, table of content, introduction, preview of the document, normative references).
 - ❑ This website is public, and WGs should first review the website for information on the document(s) they want to review.
 - ❑ If additional information or a more detailed review is needed, then the WG will need to contact their IEEE SA PM to submit a special request with the rationale for why the document(s) is/ are needed.
 - If the special request is approved by IEC, only a small number of individuals would be granted time-restricted access to the IEC document(s).
 - The WG Chair should select two individuals to review the document(s)
- ❑ Category A and C liaisons relationships follow a different process and this “new process” does not apply, nothing has changed with the liaisons.



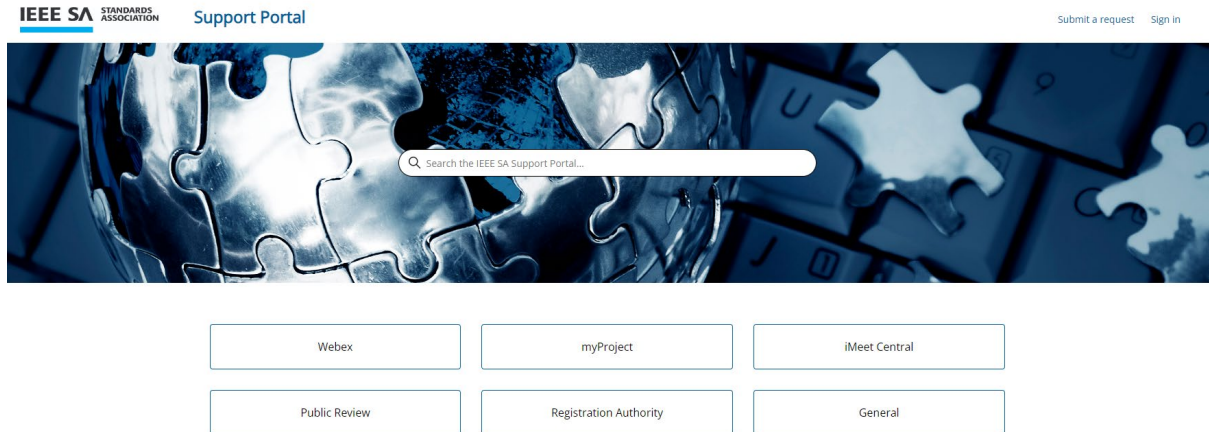
MYPROJECT - W G A W A R D S

- ❑ [Working Group Awards](#) Once there is Final approval of a project by the IEEE SASB, it is an important opportunity to recognize standards development participants with working group awards (plaques and certificates)
- ❑ *This myProject feature will allow a Working Group Chair or Vice-Chair to populate a list of award recipients based on involvement levels set in the Working Group roster.*
- *The system will automatically pull the recipient's address from their IEEE account profile if they have provided one.*
NOTE: Roster needs to be up to date in order to populate the awards list
- *Phone numbers and addresses for the recipients are now required*
- ❑ *Select the type of award the individual should receive and select a delivery method.*
- ❑ *Once all selections are made, the information can be submitted to the IEEE SA Awards Administrator for processing.*

[Steps for WG awards process](#)

IEEE SA SUPPORT PORTAL

- ❑ The IEEE SA [Support Portal](https://standards-support.ieee.org/hc/en-us) can be used to find instructions on how to complete different Standards Development tasks (Example: awards, ballot, myProject, Webex, iMeet, Public Review, Registration Authority).
- ❑ This is the link: <https://standards-support.ieee.org/hc/en-us>



CONTACT US!

Patrycja Jarosz

Program Coordinator

p.jarosz@ieee.org

908-726-8288

APPENDIX 9

Meeting Planning

SC Meetings Planning

Spring 2025 Meeting

Denver, CO

General Session

March 24, 2025

Tammy Behrens

Prolec

Meetings Subcommittee Chair

THANK YOU TO OUR MEETING HOSTS!



Jeff Gragert & Team

**THANK YOU TO EVERYONE
THAT UTILIZED THE
TRANSFORMERS COMMITTEE
ROOM BLOCK!**

Meeting Attendance

	2023 Spring Milwaukee	2023 Fall Kansas City	2024 Spring Vancouver	2024 Fall St. Louis	2025 Spring Denver
Attendees	513 (521 – 8)	569 (576 – 7)	533 (551 – 18)	628 (643 – 15)	619*
Spouses/ Companions/ Guests	24 (24 – 0)	34 (34 – 0)	54 (54 – 0)	36 (37 – 1)	31*

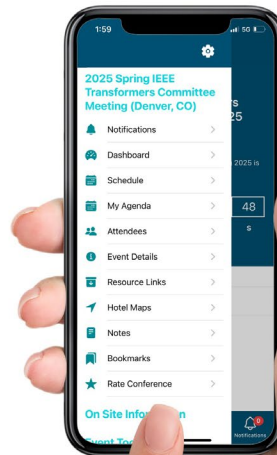
*Registrations
as of 3/23/25

MEETING APP

IEEE

EventHub

You must login with your IEEE account credentials to see the available events. If you do not have an IEEE login, you can create a free login.



EL&P Delegation

(end users only, please)

Tuesday, 7AM

Mineral DEFG

3rd Floor Mineral Hall

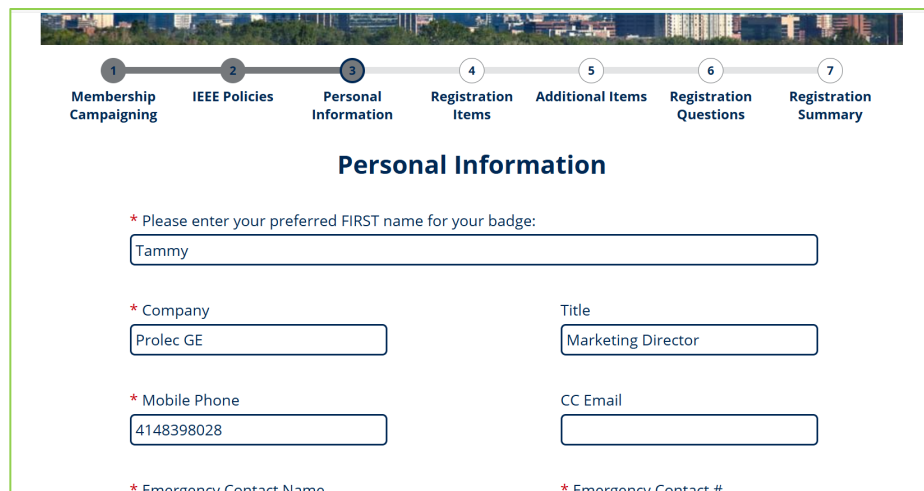
Miscellaneous Announcements

Reminder for badges: If you want the larger first name on your badge to be something other than the first name on your IEEE account, enter it in the box labeled.

Paper rosters will again need to be utilized – please print clearly.

Centennial F, G and H breakout room entrances are in the secondary hallway; Mineral Hall is past the elevators/escalators, all the way to the end of the hall and then make a left.

Bus for Thursday technical tour will load from the main entrance.



The screenshot shows a registration form with a progress bar at the top indicating seven steps: 1. Membership Campaigning, 2. IEEE Policies, 3. Personal Information (current step), 4. Registration Items, 5. Additional Items, 6. Registration Questions, and 7. Registration Summary. The 'Personal Information' section contains the following fields:

- * Please enter your preferred FIRST name for your badge:
- * Company:
- Title:
- * Mobile Phone:
- CC Email:
- * Emergency Contact Name:
- * Emergency Contact #:

WiFi: IEEETR

Password: 8006784333

Future Meetings



FALL 2025 — October 19-23
Bonita Springs, FL
Hyatt Regency Coconut Point
Resort & Spa

SPRING 2026 — March 22-26
Fort Worth, TX
Omni Fort Worth Hotel

Considerations for Future Meeting Sites

- local host and/or desirable destination
- consideration of # of attendees
- availability of technical tours and activities
- restaurants nearby
- international airport
- affordable (for the market)

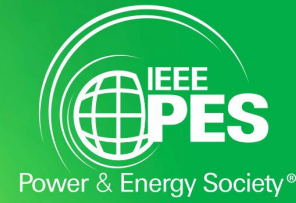
WEBSITE

Username: xfmrcom

Password: TrCp@\$w4a

**PLEASE CONTACT ME WITH ANY
FEEDBACK, COMMENTS OR
QUESTIONS AT
TAMMY.BEHRENS@PROLEC.ENERGY**

**Thank you for all your work this week
and over the course of the year!**



Meetings Planning SC

Spring 2025 – Denver, CO

Closing Session – March 27, 2025



Tammy Behrens Prolec

Meetings Subcommittee Chair

Meeting Attendance

	2023 Spring Milwaukee	2023 Fall Kansas City	2024 Spring Vancouver	2024 Fall St. Louis	2025 Spring Denver
Attendees	513 (521 – 8)	569 (576 – 7)	533 (551 – 18)	628 (643 – 15)	614 (629 – 15)
Spouses/ Companions/ Guests	24 (24 – 0)	34 (34 – 0)	54 (54 – 0)	36 (37 – 1)	31 (31 – 0)

Meeting attendance record is held by the 2024 fall meeting in St. Louis at 628; previous record was 626 at the 100th anniversary meeting in Pittsburgh, PA in 2018.

THANK YOU TO OUR MEETING HOSTS!



Jeff Gragert & Team

Future Meetings



FALL 2025 — October 19-23

Bonita Springs, FL

Hyatt Regency Coconut Point Resort & Spa

SPRING 2026 — March 22-26

Fort Worth, TX

Omni Fort Worth Hotel

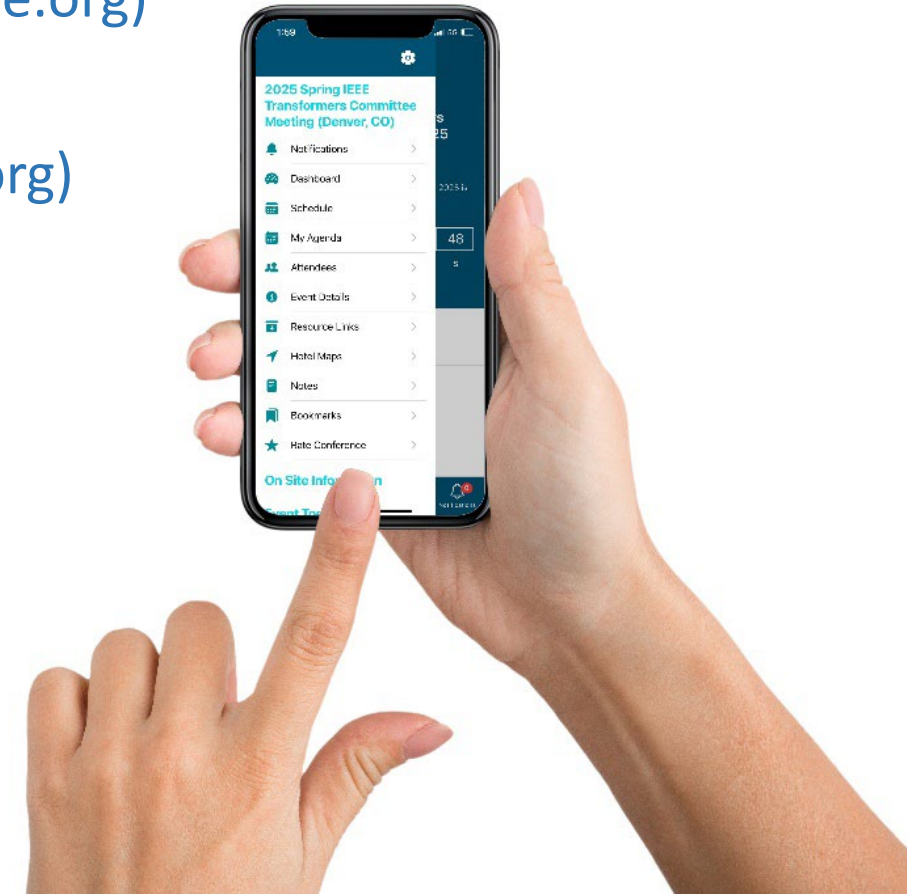
Room Block Open!

Future Meeting Site Considerations

- Local host and/or desirable location
- Consideration of # of attendees
- Availability of technical tours and activities
- Restaurants nearby
- International airport
- Affordable (for the market)

Meetings SC Task Forces

- Presentations & Tutorials: Tom Prevost (tprevost@ieee.org)
 - Break Sponsors: Ed Smith (edwards@h-j.com)
 - Website: Kris Zibert & Sue McNelly (tc-webmaster@ieee.org)
 - Mobile App: David Wallach
 - Meeting Schedule: Jerry Murphy (jerry.murphy@ieee.org)
 - Photography: George Payerle
-
- Registration Desk
 - Jennifer Quandel



Web password for
subcommittee private directory
(transformer/subcommittee/
private folder):

TrCp@\$w4a

username (as always): xfmrcom

**PLEASE CONTACT ME WITH ANY
FEEDBACK, COMMENTS OR
QUESTIONS AT
TAMMY.BEHRENS@PROLEC.ENERGY**

Thank you for all your work this week
and over the course of the year!

APPENDIX 10

Treasurer's Report

MEMORANDUM

February 26, 2025

To: David Wallach, Chair
IEEE PES Transformers Committee

RE: IEEE PES Transformers Committee Treasurer's Report
Spring 2025 Meeting
(Reporting period 09/01/2024 to 01/31/2025)

Dear David,

The finances of the Committee are in sound financial condition. As of January 31st (end of this reporting period), the checking account balance was \$411,528.16.

FYI: January 31st is a "snapshot in time" after the income/expenses for the Spring 2024 Vancouver meeting were finalized and most income/expenses were resolved from the Fall 2024 St. Louis meeting. This report also includes \$1,168.49 paid in deposits towards the upcoming Spring 2025 Denver Meeting.

Report period notes:

- The Spring 2024 Vancouver Meeting reports a final profit of \$50,539.81.
- The Fall 2024 St Louis Meeting reports a preliminary profit of \$70,608.71.
- IEEE internal auditors completed the 2023 financial audit. Results are satisfactory.

See attached summary of the balance of this reporting period, and the previous periods.

Sincerely,

Troy Tanaka, Treasurer
IEEE PES Transformers Committee

IEEE PES TRANSFORMERS COMMITTEE
Treasurer's Report - Spring 2025
(for reporting period 09/01/2024 to 01/31/2025)

S25

A	Ledger Balance at Period Opening; 9/01/2024	\$ 334,723.13
	<u>Misc Income, not related to a specific meeting</u>	
B1	interest, approx 6 months	\$ 7,701.70
B2	misc income; shirt sales, CD-ROM sales, book sales, etc.	\$ 0.00
B	Total Misc Income, not meeting related	\$ 7,701.70
	<u>Misc Expenses, not related to a specific meeting</u>	
c1	Authorized.Net	\$ (275.00)
c3	equipment purchases; projectors & cases, etc.	\$ 0.00
c4	technology; RFID tech, meeting app, WiFi equip, printers & ink, cables, etc	\$ 0.00
c5	conferences, JTCM, PES GM, remote meetings, etc.	\$ 0.00
c6	other misc. expenses; shirts, audit, books, office supplies, name badges, etc.	\$ (4,311.89)
c7	memorial	\$ 0.00
C	Total Misc. Expenses, not meeting related	(\$4,586.89)
	<u>Spring 2024 Meeting</u>	
D1	Late Revenue, meeting registrations	\$ 0.00
D2	Misc late Revenue (incentives, late sponsor contributions, etc.)	\$ 0.00
D3	Late meeting expenses	\$ 0.00
D	Total Late Income/(expenses), Spring 2024 Meeting	\$0.00
	Previous Revenue/Expenses	\$50,539.81
	Gain/(Loss) Spring 2024 Meeting	\$50,539.81
	<u>Fall 2024 Meeting</u>	
E1	Revenue, meeting registrations	\$ 413,208.76
E2	Revenue, coffee break sponsors	\$ 25,050.00
E3	Meeting expenses	\$ (363,400.05)
E	Profit/Loss between 09/01/2024 to 1/31/2025	\$74,858.71
	Meeting income (expenses) Prior to 9/01/2024	(\$4,250.00)
	Profit/(Loss), Fall 2024 Meeting*	\$70,608.71
	<u>Expenses, Future Meetings (deposits paid, etc)</u>	
F1	Future Meeting Revenue between 09/01/2024 to 01/31/2025	\$ 0.00
F2	Future Meeting Expenses between 09/01/2024 to 01/31/2025	\$ (1,168.49)
F	Total Meeting Revenue/(Expenses) for Future Meetings between 09/01/2024 to 01/31/2025	(\$1,168.49)
G	Net Income (loss), between Fall 2024 and Spring 2025 meetings (B+C+D+E+F)	\$76,805.03
	Ledger/Bank Balance at Period Closing, 01/31/2025 (A + G)	\$ 411,528.16

Spring 2024 - Vancouver Expenses/Revenue Reporting Through 1/31/25

	EXPENSES	REVENUE
<u>Meeting Revenue</u>		
Revenue from Registrations		\$ 359,916.00
Break Sponsors		\$ 20,179.80
Hotel Credits		\$ 24,369.05
<u>Meeting Expenses</u>		
Food and Beverage	\$ (199,307.13)	
Audio Visual	\$ (31,180.79)	
Sunday Night Social	\$ (1,111.89)	
Wednesday Night Social	\$ (54,488.61)	
Spouse Socials	\$ (29,617.33)	
Cvent	\$ (10,353.56)	
Awards	\$ (697.66)	
Quandel Hospitality LLC	\$ (9,755.94)	
Transportation	\$ (4,615.74)	
Shipping Costs	\$ (833.01)	
Credit Card Fees associated with Registration	\$ (11,707.79)	
Miscellaneous	\$ (255.59)	
<u>Total Revenue/Expenses</u>	\$ (353,925.04)	\$ 404,464.85

<u>S24 Gain/Losses</u>	\$ 50,539.81

Note:

1. Break Sponsors includes additional revenue of \$10,679.80 by previous meeting sponsor (IFD Technologies)
2. Hotel Credits includes \$14,758.13 from Destination Vancouver

Fall 2024 - St Louis Expenses/Revenue Reporting Through 1/31/25

	EXPENSES	REVENUE
<u>Meeting Revenue</u>		
Revenue from Registrations		\$ 385,215.00
Break Sponsors		\$ 25,050.00
Hotel Credits		\$ 27,993.76
<u>Meeting Expenses</u>		
Food and Beverage	\$ (246,219.32)	
Audio Visual	\$ (37,083.65)	
Sunday Night Social	\$ (960.00)	
Wednesday Night Social	\$ (29,470.94)	
Spouse Socials	\$ (6,074.00)	
Cvent	\$ (11,966.68)	
Awards	\$ (189.64)	
Quandel Hospitality LLC	\$ (11,924.83)	
Transportation	\$ (10,080.00)	
Shipping Costs	\$ (1,261.64)	
Credit Card Fees associated with Registration	\$ (11,518.35)	
Miscellaneous	\$ (901.00)	
<u>Total Revenue/Expenses</u>	\$ (367,650.05)	\$ 438,258.76

<u>F24 Gain/Losses</u>	\$ 70,608.71

Note:

1. Break Sponsors includes additional revenue of \$13,050.00 by previous meeting sponsor (H-J Enterprises)

ANNEX A Bushings Subcommittee

Denver Colorado USA
March 30, 2025, 09:30 AM

Chair: Scott Digby, Duke Energy
Secretary: Fabian (Durand) Stacy, Hitachi Energy

A.1 Opening of the Meeting

A.1.1 Call to Order / Chairman's Opening Remarks

Attendees were informed that the meeting would be audio recorded for the purpose of creating meeting minutes with the intent to delete this recording once the minutes were approved.

The Chair covered the scope of the bushing Subcommittee by reading the scope from the transformer committee operation procedures manual 2016.

The Chair requested that each person use the microphone and to state their name and affiliation when addressing the Subcommittee.

The Chair reminded the WG chairs and secretaries that their meeting minutes need to be submitted to the Subcommittee officers no later than 15 days after their WG or TF meetings took place in this case they shall be submitted by April 10th, 2025 and the Subcommittee is to have its meeting minutes submitted by May 8th, 2025. Section 6.4 of the PandP manual covers what must be in these minutes.

The Chair discussed the membership management system and the remaining need to use a paper roster for attendance until we have an updated system.

A.1.2 New Members

It was reported that 4 new members have been accepted into the Subcommittee. (Edwin Betancourt, Junho Lee, Markus Schiessl, and Fei Yang).

A.1.3 Attendance

Participant rosters were circulated during the meeting to record the meeting attendance. The Chair presented a list of the 79 current voting members to perform a quorum check. A quorum was achieved. Per subsequent review of the rosters, the meeting had 132 attendees, of which 56 were members and 76 guests, with 8 guests requesting membership. Refer to [Appendix A](#) for meeting participants, their affiliation, and voting member status.

Table 1 – Meeting Attendance

Total	132
Members – Quorum Achieved	56
Guests	76
Guests Requesting membership*	8

*A review of the historical attendance records indicates that of the 8 guests requesting membership, 1 meet the eligibility requirements (Robert L Allison) and will be added to the membership roster effective at the next SC meeting.

A.1.4 Agenda Approval

As 56 of the 79 members were in attendance, a quorum was achieved. There were no comments on the proposed agenda. A motion was made by Sebastien Riopel Electro Composites ULC and seconded

by Samson (Sami) Debass EPRI to approve the agenda as proposed. This motion was carried by unanimous consent.

A.1.5 Previous Meeting's Minutes Approval

There were no comments on the minutes that had been posted. A motion was made by David Wallach, Duke Energy, and seconded by Samson (Sami) Debass EPRI to approve the minutes as posted. This motion was carried by unanimous consent.

A.2 Working Group and Taskforce reports

A.2.1 IEC/IEEE 65700-19-03 Bushings for DC Application – Eric Weatherbee (IEEE) and Lars Jonsson (IEC), Co-Chairs; Sami Debass, Vice-Chair; J. Arturo Del Rio, Secretary

See the complete WG minutes in [Appendix C](#) of this report.

The WG Chair reported that this was approved unanimously last November, and IEC just completed their process with 100% approval. It was determined that this could be sent directly to Revcom without additional action being taken.

A.2.2 WG C57.19.00-2023 – Peter Zhao, Chair; **VACANT, Vice-Chair; Eric Weatherbee, Secretary**

No meeting was held due to the publication of the new revision of the standard last year.

A.2.3 WG C57.19.02 Distribution Transformer Bushings – Steven Shull, Chair; Ed Smith, Vice-Chair, Rhett Chrysler, Secretary

No Meeting due to the status of the publication

A.2.4 WG PC57.19.01 – Dr. Shibao Zhang, Chair; **VACANT, Vice-Chair; Dominic Pollaro, Secretary**

See the complete WG minutes in [Appendix C](#) of this report

- Discussed Nominal System Voltages vs MAX Line to Ground Voltages for 115 kV & 138 kV discussion
- Discussed RIS bushing C1 power factor & % change limits
- Discussed "P" & "Q" dimensions on 46 kV 5000 amp in the standard does not provide enough sealing surface for gasket or O-ring and will be requesting information from bushing manufacturers on their stand practices for these bushings.

A.2.5 WG C57.19.02 Distribution Transformer Bushings – Steven Shull, Chair; Ed Smith, Vice-Chair, Rhett Chrysler, Secretary

No meeting due to the status of the publication.

A.2.6 WG C57.19.04-2018 – Scott Digby, Chair; Rich vonGemmingen, Vice-Chair; Anthony Natale , Secretary

See the complete WG minutes in [Appendix D](#) of this report.

The WG reviewed the comments that were generated from the circulated draft D1 of the document. Two comments were editorial, and the rest of the meeting was used to review the remaining comments.

A.2.7 WG PC57.19.100-2012 – Tommy Spitzer, Chair; **VACANT, Vice-Chair; Fabian (Durand) Stacy, Secretary**

See complete WG minutes in [Appendix E](#) of this report.

The WG is working through the balloting process with 92% approval and 153 comments, most of which are editorial, and remains on track to complete before the PAR expiration at the end of the year.

A.3 External Liaison Reports

A.3.1 IEC Bushing Standards Activity – Kurt Kaineder, IEEE/IEC Liaison

See the complete report in [Appendix F](#) of this report.

Some of the key information included the following: 1) DC bushing standard is on track to be published in early 2025, 2) Tap adapter standardization for 550kV and above, IEEE will review their results as a similar subject is being addressed in 19.01. The approval was given to move forward, and work will start in March 2025. 2) Dimensional Standardization Part 1 will involve MV bushings only and is currently being considered as a non-mandatory specification but may become a standard/mandatory in the future. 3) The seismic standard will be reviewed with a call for experts. 4) The MT5 also has a call for experts.

A.3.2 Amendment to IEEE 693, Recommended Practice for the Seismic Design of Substations - Durand Stacy

Reported that the amendment was passed and is now published. The WG for IEEE 693 is in the process of PAR creation for the new revision, and the next meeting will be a Hybrid meeting in New Orleans, LA, on May 14th, 2025, and encourages all interested parties to attend.

A.4 Unfinished Business

Testing methods regarding determining if a bushing is prone to PD during FAT: Egon Kirchenmayer, Siemens Energy, stated that their company is still underway with its experimentation, with an expected completion date of sometime this summer. With that in mind, we will keep this on the radar.

A.5 New Business

1. Shibao Zhang, PCORE Electric, brought forth his belief that the bushing sub-committee should make its own standard for bushing seismic tests due to the IEEE 693 document growing to about 800 pages and stated the view that it had drifted from the original method for bushing qualification. He stated he has seen it change from the document providing certainty for the industry to uncertainty. "In the past, we had criteria where with high voltage bushing would be shake-table tested, and the low voltage bushing we would be tested with static pull testing, and there were clearly defined test methods with a clearly defined pass or fail criteria for these tests." He stated that it is clear to him that the bushings that passed these criteria are not failing in the field, and he believes that this is an indication that, in reality, these test methods are good. With the new amendment, it is his belief that everything has changed with the introduction of the requirement for modeling the bushing transformer system using unverified models. The new amendment requires dynamic analysis

of the bushing transformer system, and there is a need to redo this analysis every time a bushing is exchanged if it is not an exact duplicate of the bushing being replaced, and this will result in reduced interchangeability.

A suggestion was made to form a task force to consider the IEC seismic standard in this review.

Support was given to the creation of the task force by members and visitors attending the bushing subcommittee meeting for a simplified document that the bushing committee could maintain.

Shibao Zhang PCORE Electric made a motion to:

"To create a task force to check the feasibility of making the bushing seismic standard, potentially associated with IEC seismic standard, to determine what is required to create a harmonized standard for bushing qualification, and the deliverable from this task force is to report back to the bushing sub-committee with a recommendation on how to proceed based on the gathered information."

The motion was seconded by Sanjib Som of Pennsylvania Transformer

The motion carried with no opposition.

The Chair stated he would follow up with his appointment for the person to lead this task force.

2. Peter Zhao from Hydro One commented on the need to add new technologies to the standards to describe the differences between the legacy technologies, OIP, etc., compared to the dry-type bushings. Discussion were then had that these new technologies are being incorporated into the standard when they are being updated today. The Chair asked for examples of things not being considered today while pointing to C57.19.01 meeting minutes, where a table was being updated to include the dry offerings. This discussion did not result in a proposal. Peter ended the conversation by mentioning that younger engineers should be more active in creating standards.

A.6 Adjournment

A.7 Next Meeting: Fall 2025, BONITA SPRINGS, FLORIDA, USA OCTOBER 19 – 23.

Last Name	First Name	Role	Company
Abbas	Mubarak	M	Siemens Energy
Adams	Kayland	M	Prolec-GE Waukesha
Alexander	Anthony	G	Hitachi Energy
Allison	Robert	G	Dominion Energy
Alonso	Mario	G	Georgia Transformer
Antosz	Stephen	G	Stephen Antosz & Associates, Inc
Ashwini	Labh	G	Hitachi Energy
Avanoma	Onome	M	MJ Consulting
Beaudoin	Jason	G	Weidmann Electrical Technology
Bhardwaj	naveen	G	Trench Group
Boettger	William	M	Boettger Transformer Consulting LLC
Bradshaw	Jeremiah	G	Bureau of Reclamation
Calitz	David	M	Siemens Energy
Castellanos	Juan	M	Prolec GE
Cruz Valdes	Juan Carlos	M	Prolec GE
Debass	Samson (Sami)	M	EPRI
Del Rio	J. Arturo	M	HSP-US LLC
Delgado	Gabriel	M	Invenergy
Digby	Scott	M	Duke Energy
Duffy	Jesse	G	Nashville Electric Service
Elson	Eric	G	SDGE
Ermakov	Evgenii	M	Hitachi Energy
Euvrard	Eric	M	RHM International
Frazier	Raymond	M	Ameren
Gagnon	Jean-Philippe	G	Qualitrol
Gamboa	Jose	M	H-J Family of Companies
Garcia Wild	Eduardo	M	Siemens Energy
Giraldo	Orlando	G	H-J Family of Companies
Goglia	Slaven	G	Koncar Power Transformers
Griesacker	Bill	M	W. Griesacker & Associates Inc.
Gustavsson	Niklas	M	Hitachi Energy
Hampton	Kevin	G	Siemens Energy
Hayes	Roger	M	GE Verona
Hermann	Florian	G	Trench France
Hernandez	Ronald	M	Doble Engineering Co.
Hollrah	Derek	M	Burns & McDonnell
Hossain	Saif	G	Trench Limited
Jarosz	Patrycja	G	IEEE SA
Jeong	Chanmin	G	HD Hyundai
Johnson	Reeve	G	Hitachi Energy
Kadar	Laszlo	G	Laszlo & Associates
Kaineder	Kurt	M	Trench Austria

Kasonga	Mick	G	oncor
Kirchenmayer	Egon	M	Siemens Energy
LaBean	Bernard	G	Consumers Energy
Lakkaraju	Sai	G	Xcel Energy
Loiselle	Luc	G	Tetra Tech
Machain	Jose Luis	M	Prolec-GE
Mani	Kumar	M	Duke Energy
Manzano	Moses	G	Hyosung HICO
Martinez Mares	Alberto	G	WEG Transformers USA
Matson	Tomas	G	Xcel Energy
Middleton	Robert	M	RHM International
Millard	Zachary	G	Great River Energy
Mills	Francis	M	POWER Engineers Inc.
Munoz	Marta	G	Hitachi Energy
Murray	David	G	Tennessee Valley Authority
Musgrove	Ryan	G	Oklahoma Gas & Electric
Natale	Anthony	G	HICO America
Newbill	Mark	G	Hitachi Energy
Nolte	Mike	G	Kiewit
Ogajanov	Rudolf	G	ABB Inc.
O'Malley	Anastasia	G	Consolidated Edison Co. of NY
Pandya	Manan	G	siemens energy
Park	Dean	G	Hyosung HICO
Patel	Poorvi	M	Electric Power Research Institute (EPRI)
Patel	Monil	G	PG&E
Patel	Rakesh	G	Hitachi Energy
Patel	Sanjay	G	SGB SMIT
Pellon	Verena	G	Florida Power & Light
Perez	Marcelino	G	Prolec GE
Portillo	Homero	G	Advanced Power Technologies
Propts	Thomas	G	Dominion Energy
Raymond	Timothy	M	Inductive Reasoning
Reed	Scott	M	MVA
Reiss IV	Clemens	G	Custom Materials, Inc.
Reyes	David	G	Oncor
Riopel	Sebastien	M	Electro Composites ULC
Robalino	Diego	M	Megger
Roman	Zoltan	M	GE Grid Solutions
Rutledge	Chris	G	Dynamic Ratings
Ryu	Hyounggon	G	
Sanchez Rodriguez	Jesus	G	Voltyx/NASS
Sankarakurup	Dinesh	G	Duke Energy

Sarkar	Amitabh	M	Virginia Transformer Corp.
Sarkinen	Garret	G	Xcel Energy
Schiessl	Markus	M	SGB
Schleismann	Eric	M	Southern Company Services
Schrammel	Alfons	G	Siemens Energy
Schweiger	Ewald	M	Siemens Energy
Scott	Cosy	G	The H-J Family of Companies
Sen	Cihangir	M	Duke Energy
Shaikh	Salahuddin	G	NRG Energy
Shertukde	Hemchandra	G	Hartford.edu
Singh	Amikumar	G	Conedison
Skeik	Ahmad	G	Crosslink Technology
Snyder	Jason	G	FirstEnergy
Solano	William	M	Voltex
Som	Sanjib	M	Pennsylvania Transformer
Spitzer	Thomas	M	City Transformer Service Co.
Stacy	Fabian	M	Hitachi Energy
Stechschulte	Kyle	G	American Electric Power
Steele	Hampton	G	Tennessee Valley Authority
Steineman	Andrew	G	Delta Star Inc.
Szczechowski	Janusz	G	Maschinenfabrik Reinhausen
Tan	Jonathan	G	Northern Transformer
Tanaka	Troy	M	Burns & McDonnell
Thomas	Scott	G	Hitachi Energy
Torchia	Leonard	G	PSE&G
Varghese	Ajith	M	Prolec-GE Waukesha
Varnell	Jason	M	Doble Engineering Co.
Vermette	Yves	M	Electro Composites ULC
Vir	Dharam	M	Prolec GE Waukesha Inc
vonGemmingen	Richard	M	Dominion Energy
Vullo	Stephen	G	Konciar
Wagner	John	G	AEP
Wallach	David	M	Duke Energy
Weatherbee	Eric	M	PCORE Electric
Weisensee	Matthew	M	PacifiCorp
Werelius	Peter	M	Megger
Whitten	Christopher	M	Hitachi Energy
Wong	Terry	G	Trench Limited
Wright	Jeffrey	G	Duquesne Light Co.
Yang	Fei	M	Hitachi Energy
Young	Tim	G	Hitachi Energy
Yu	Zachary	G	Seiyuan Electric
Zambrano	Jose	G	HSP US

Zhang	Shibao	M	PCORE Electric
zhang	hongzhi	G	Hitachi energy
Zhao	Peter	M	Hydro One
Zhou	Anna	G	JST Power
Ziomek	Waldemar	G	PTI Transformers

F24 Unofficial Standards Status Report

Standard Project	Title	WG Chair	Pub Year Rev. Due Date	PAR Issue Par Expiration	Comments
C57.19.00	IEEE Standard General Requirements and Test Procedure for Power Apparatus Bushings	P. Zhao	2023 2033		Not Active
PC57.19.01	IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings	S. Zhang	2017 12/2027	2024 12/2028	PAR has been approved, held first WG meeting
C57.19.02	Standard for the Design and Performance Requirements of Bushings Applied to Liquid Immersed Distribution Transformers	S. Shull	2023 2033		Not Active
P65700-19-03	IEC/IEEE International Standard -- Bushings for DC application	Eric Weatherbee	2014 12/2024	2021 12/2025	IEC Comments have been resolved. No IEEE comments received. Estimate recirculation Spring 2025
PC57.19.04	Standard Performance Characteristics and Dimensions for High Current Power Transformer Bushings with Rated Continuous Current in Excess of 5000 A in Bus Enclosures	S. Digby	2018 12/2028	2024 12/2028	PAR has been approved, held first WG meeting
PC57.19.100	IEEE Guide for Application of Power Apparatus Bushings	T. Spitzer	2012 12/2022	2019 12/2025	WG voted to move forward to ballot, needs SubCom approval

WG PC57.19.01 – Meeting Minutes Performance Characteristics and Dimensions for Transformer and Reactor Bushings)

9:30 – 10:45 am, Mineral Hall BC (3)

Hyatt Regency Denver, Colorado

Tuesday, March 25th, 2025

Denver, Colorado USA

Chair: Shibao Zhang; Vice Chair: J. Arturo Del Rio; Secretary: Dominic Pollaro

ATTENDEES	MEMBER STATUS	ATTENDEES	MEMBER STATUS
J. Arturo Del Rio	Vice Chair	Terry Wong	N
Scott Digby	Y	Manuel Quinones	N
Jose Gamboa	Y	Fernando Tirado	N
Kurt Kainerder	Y	Daniel Obreqpm	N
Moses Manzano	Y	Jim Norton	N
Hugo Murillo	Y	Reeve Johnson	N
David Reyes	M	Niklas Gustavsson	N
Shibao Zhang	Chair	Patrick Foster	N
David Reyes	Y	Juan Carlos Cruz Valdez	Y
Cihangir John Sen	Y	Orlando Giraldo	Y
William Solano	Y	Ashwini Labh	Y
Matt Weisensee	Y	Mario Locarno	Y
Chris Witten	Y	Anthony Natale	Y
Tim Young	Y	Sebastian Riopel	Y
Anthony Alexander	N	Eric Schleismann	Y
Weijun Li	Y	Cody Schott	Y
Filip Mikulecky	N	Yves Vermette	Y
Eric Weatherbee	Y	Eric Euvard	N
Florian Hermann	Y	Bob Middleton	N
Nirav Patel	N	Durand Stacy	N
Alfons Schrammel	N	Chanmin Jeong	N
Ahmad Skeik	N	Kevin Hampton	N
Leonard Torchia	N	Mike Nolte	N
Issac Abdalla	N	Homer Portillo	N
Jesus Sanchez Rodriguez	N	Geraldo Magela Jr.	N
Mo Agharahimi	N	Nidzar Turcinhodzic	N
Johnathon Reimer	N	Robert Allison	N
Josh Aries-Garcia	N	Ben Hershberger	N
Dominic Pollaro	Secretary	Marcus Scheffer	N

Meeting Overview

This was the second meeting of the Working Group (WG). There were 58 attendees.

Out of 37 TG members, 26 were present, achieving a quorum.

Agenda Approval

The agenda was unanimously approved (First by Scott Digby, Second by Kurt Kaineder). Attendees introduced themselves and reviewed the IEEE SA Copyright Policy, Participant Behavior, and Patent Policy. No issues or concerns were raised.

Previous Meeting Minutes

The minutes from the last TF meeting in St. Louis were sent to all TF members before this WG meeting. There were no concerns raised during the meeting. The previous meeting minutes were unanimously approved (First by Sebastian Riopel, Second by Matt Weisensee). No objections.

PAR & Timeline

The team reviewed the PAR approved by REVCOM on May 22nd, 2024, with an expiration date of December 31st, 2028. The Chair presented the revised timeline, extending the completion year to 2028 from the originally discussed 2027. No rejection last meeting, therefore, we will continue with previous timeline as defined below.

- F24 (WG meeting) – in person discussions
- S25 (WG meeting) – in person discussions
- F25 (WG meeting) – in person discussions
- S26 (WG meeting) – in person discussions
- F26 (WG meeting) – in person discussions
- S27 (WG meeting) – in person discussions
- F27 (WG meeting) – in person – Vote on the draft for ballot; submit for editing before ballot • January 1st – January 31st, 2028, 1st ballot
- S28 (WG meeting) – Review ballot results, form resolution group with visual meetings as needed;
- June 1st– June 30th, 2028, 2nd ballot if needed
- F28 (WG meeting) – Finalize all work • By end of 2028, submit to RevCom for approval as a standard

Discussed Topics

1. Nominal System Voltages vs MAX Line to Ground Voltages for 115 kV & 138 kV discussion

Currently, the 115 kV & 138 kV designs have 88 kV & 102 kV L-G voltages, respectively.

History:

The discussion is regarding bushing selection. The transformer table does not refer to Line to ground voltage at all; instead, system voltage and BIL.

There is confusion between the bushing standard C57.19.01 & the transformer standard C57.12.00. As transformer engineers select bushings, the selection criteria is less about line to ground voltage and more about BIL based on winding requirements. The transformer designer practice is to select a bushing one BIL larger than transformer winding BIL.

Bushing designers consider first one minute withstand based on BIL, irrespective of system voltage. Transformer designers consider first the BIL rating then make sure all other system requirements are met. i.e. L-G voltage.

The motion is to discuss the subject of L-G voltage for both 115 kV & 138 kV bushings and IF they need to be in line (changed) to those values listed within C57.12.00.

Motion to keep the table as listed C57.19.01 unchanged with respect to L-G Voltages.

First: Kurt Kaineder Second: Sebastian Riopel No Objections were posted.

2. "P" & "Q" dimensions on 46 kV 5000 amp in standard does not provide enough sealing surface for gasket or O-ring.

In the 2017 version, first time we put in the 46 kV/ 5000-amp design.

P =flange Max
Q=sealing surface.

248 mm =P
254 mm=Q
3mm sealing surface

The intent is to change the standard such that a proper sealing surface can be provided to transformer manufacturers.

Motion is to collect data from Transformer Manufacturers.

First: Sebastian Riopel Second: Scott Digby No Objections

**Information for. all the dimensions (per table) for 46 kV/5000-amp bushing to be sent to :
ZHANG/ARTURO/POLLARO accordingly such that information can be reviewed.**

Sebastian will send info/ data on behalf of Electro Composites. Duran Stacy will send info on behalf of Hitachi. Robert Middleton for RHL, and Eric Weatherbee for PCORE.

3. TABLE 5: Partial Discharge Limits_ Discussion Points for RIS Bushings

Suggestions:

- ✓ Add Partial Discharge Limits for RIS Bushing
- ✓ Consider Partial Discharge_ 2x L-G Voltage for Other Dry Type
- ✓ Clearly specify in Note c that the 1 h duration is for bushing design test

Motion: To add RIS same as RIP @ 10 pC Level @ 1.5 x L-G Voltage for 1 hour and (specify Note c: of 1 h duration is for bushing Design Test)

First: Kurt Kaineder Second: Juan Carlos Cruz Valdez No Objections

4. RIS Bushing C1 Power Factor & % Change Limits add to (Table 6)

Suggestions:

- ✓ Add another line for RIS to Table 6 and specify the limits
- ✓ RIS PF limit to be 0.5%

Motion 1: Add RIS to Table and make limit 0.5% (similar to OIP) - Yes

First: L. Weijun Second: Kurt Kaineder No Objections

What is acceptable change? Copy OIP? Arturo

Motion 2: To keep variation of PF & Capacitance of RIS to copy OIP regarding acceptable range Yes.

First: J. Arturo Del Rio Second: Li Weijun No Objections

New Business – none

Next Meeting: F25_ October 19-23_ Hyatt Regency Coconut Point Resort

Meeting Adjourned: 10:39 am

Working Group C57.19.04
Standard Requirements for Bushings
above 5000A in Bus Enclosures
March 25th, 2025 1:45-3:00 PM
Denver, Colorado
UNAPPROVED MINUTES

1. Introduction

- Meeting was called to order at 1:46PM by Chair Scott Digby.
- Minutes recorded by Secretary Anthony Natale. Vice Chair is Rich von Gemmingen.

2. Agenda Review

- Agenda was presented.

3. Call for Essential Patents, IEEE Copyright Policy, Behavior Policy

- Slides were shown. No essential patents were identified.

4. Membership

The WG has 33 members. 33 people were in attendance including 24 members and 9 guests. 2 guests requested membership and their attendance will be reviewed to see if they meet the requirements. More than 50% of members are present so quorum is established.

5. Agenda Approval

- Motion to approve the agenda was made by Kumar Mani and seconded by Durant Stacy.
- Approved by unanimous consent.

6. Minutes Approval

- Minutes Fall 2024 meeting were shown.
- Motion to approve the minutes was made by Sebastian Riopel and seconded by Durant Stacy.
- Approved by unanimous consent

7. PAR Status Update / Timeline & Milestone Review

- PAR expires December 31st, 2028.
- Active document was published in 2018 so will expire on December 31st, 2028
- About 3 years or 6 Transformer Committee meetings to work including this one
- Reserving the final year for balloting gives an objective to complete work and ready for Sponsor Ballot by end of 2027 or sooner

8. Review of Comments from Circulation of Draft D1

- a. 2 comments are editorial
 - i. Shibao Zhang – Subclause 2: Title of C57.19.01 needs to be updated by changing "for outdoor apparatus bushings" to "for transformer and reactor bushings"
 - ii. Shibao Zhang – Subclause 3.2: C57.19.00-2004 should be C57.19.00-2023
- b. Dry Switching Impulse
 - i. Shibao Zhang – Table 1: Dry switching impulse is not directly tested in transformer or bushings. Impulse test is more critical than switching for low voltage bushings. Recommendation is to eliminate Column 10 and Note 3.
 - ii. Comment from Sebastian Riopel: Since dry switching is not in 19.01 for these voltage classes, it makes sense to not have them here either.

- iii. Comment from Kumar Mani: Agree also since they won't be tested in the transformer standard either.
- iv. Consensus opinion seems to agree to remove dry switching
- c. Figure 1
 - i. Shibao Zhang / PCore Electric offered a new Figure 1 that is a better pictorial description of the difference between bushings in bus duct per 19.04 and bushings in open air per 19.00 with a corresponding table.
 - ii. Comment from David Stockton: This is a great representation, but wonders if showing the "regular bushing" as well will confuse users.
 - iii. Comment from Eric Weatherbee: The "regular" bushing could be put in an appendix
 - iv. Comment from Shibao Zhang: The side-by-side comparison best highlights the differences
 - v. Comment from Durant Stacy: It would not uncommon to shown figures like this in standards. Shading the 19.00 figure with a note that it's for reference is a possibility.
 - vi. Comment from Tim Young: Comments regarding the language of "regular" and "high temperature" opened a debate on the language
 - vii. Comment from Sebastian Riopel: It's also possible to split these into two figures which refer to each other for clarify.
 - viii. Comment from Kumar Mani: Comments on if the oil level is necessary to be shown since most GSU are filled to the cover without air space. A response was that it was shown because the standard requires a 2" gap for testing.
 - ix. Comment from Nirav Patel: The shape of the terminals and tap is also not indicative of GSU bushings and could be cleaned up.
 - x. Action: The new figure and table will be embedded in the next draft and circulated for comments to be discussed at the next meeting.
- d. General Comment
 - i. Barry Beaster made a general comment about new technologies allowing for refined condenser designs and how this affect future interchangeability.
 - ii. Comment from David Stockton: Condenser design is often not the driving design factor for these bushings, the conductor is.
 - iii. Comment from Sebastian Riopel: Smaller dimensions can be done as long as the transformer supplier maintains the minimum required dimensions for interchangeability.
 - iv. Comment from Kumar Mani: Agree, as long as the bolt holes and flange are maintained, the bushings can have some smaller dimensions.
 - v. Action: Clarification is needed from the commenter on what specific changes they feel are necessary.

9. Old Business

- a. Update from Art Del Rio on tap extensions. This was a third party product and is not applicable for inclusion in the standard.
- b. Comment from Kumar Mani: Are references to monitoring systems applicable? Response is that this would fall outside the scope of this document.
- c. Comment from Chris Whitten: Are these extensions flexible? Art Del Rio replied no, they are rigid.

10. New Business

- a. David Stockton inquired if any mention of overloadability of dry vs oil bushings needs to be mentioned since it was a big topic for C57.19.100 and how it may pertain to bushings in bus ducts.
- b. Comment from Nirav Patel: This would be related to derating bushings in bus ducts but that is not the scope of this document but possible the application guide 19.100.
- c. Comment from Eric Weatherbee: Bushing manufacturers do not do derating for bushings in bus ducts.

- d. Comment from Durant Stacy: Agree, all the materials have to be rated for the full temperatures seen in the bus duct application.

11. Adjournment

- Meeting was adjourned at 2:34 pm.
- Next meeting will be at the Fall 2025 Transformers Committee meeting in Bonita Springs.

12. Attendance List

Mubaark	Abbas	Virginia Transformer	Member
Anthony	Alexander	Hitachi Energy	Member
John	Bule	DTE Energy	Guest
Juan Carlos	Cruz Valdes	PROLEC GE	Member
Scott	Digby	Duke Energy	Member
Florin	Faur	Prolec-GE	Guest
Jose	Gamboa	The H-J Family of Companies	Member
Orlando	Giraldo	The H-J family of companies	Member
Florian	HERMANN	Trench France	Member
Del Rio	J Arturo	HSP-US	Member
Reeve	Johnson	Hitachi Energy	Guest
Kurt	Kaineder	Trench Austria	Member
Mario	Locarno	Doble engineering	Member
Kumar	Mani	Duke Energy	Member
Filip	Mikulecky	Koncar Power Transformers Ltd.	Member
Anthony	Natale	HICO America	Member
Dean	Park	Hyosung Hico	Guest
Nirav	Patel	Yash Highvoltage Ltd	Member
MARCELINO	PEREZ	PROLEC	Requesting
David	Reyes	Oncor	Requesting
Sebastien	Riopel	Electro Composites	Member
Stefan	Schindler	Maschinenfabrik Reinhausen	Guest
Ahmad	Skeik	Crosslink Technology	Guest
Fabian	Stacy	Hitachi Energy	Member
David	Stockton	SBC	Member
Yves	Vermette	Electro Composites	Member
Richard	VonGemmingen	Dominion Energy	Member
Eric	Weatherbee	PCORE electric	Member
Matthew	Webb	GE VERNOVA	Member
Christopher	Whitten	Hitachi Energy	Member
Samuel	Young	Hitachi Energy	Member
Eva	Zarco	Yash	Guest
Shibao	Zhang	PCore	Member

IEEE PC57.19.100
Guide for Application of Power Apparatus Bushing WG
Minutes of 2025 Spring Meeting

Monday, March 24th, 2024- 3:15-4:30 PM

HYATT Regency – Denver, Colorado

Tommy Spitzer– Chair

Durand Stacy – Secretary

The WG met on Monday, March. 24, 2024, at 3:15 PM in the Mineral Hall BC.

1. Welcoming and Call for Patents, Copyrights

- The meeting was called to order at 3:15 PM by the WG Chair.

2. Meeting

- An announcement was made that the meeting would be recorded to help with the creation of the meeting minutes, and the recording would be deleted once the minutes were approved.

3. Quorum

- Total of 51 participants: 12 members and 39 guests.
- A quorum was reached

4. Agenda was shown on screen

- Sami Debass Epri made a motion to approve the agenda
- Juan Carlos Cruz Valdes Prolec GE seconded the motion.
- No objections to the unanimous approval of the agenda.

5. Patent and copyright slides were shown

6. Call to approve the meeting minutes for the last two meetings, Spring and Fall 2024

- No objections to unanimous approval

7. Status of document

- The ballot occurred between the Fall 2024 and Spring 2025 meeting.
- Meet 75% participation
- The ballot received 92% approval with 153 comments. Of the 153 comments, only 26 are technical (many are duplicated). Three people have volunteered to be part of the comment resolution process. This team consists of Sebastien Riopel Electro Composites ULC, Eric Weatherbee PCORE Electric, and Peter Zhao Hydro One. A call was made for someone to help with the Word documents, but no one came forward.

8. Call for new business

- None was brought forth

9. Introduction

- Since we had time, the people present were asked to introduce themselves.

10. Motion to adjourn

- Sami Debass Epri made a motion to adjourn
- Juan Carlos Cruz Valdes Prolec GE seconded the motion.
- Adjourned at 3:27 PM

Respectfully submitted,

Chair: Tommy Spitzer (t.spitzer@sbcglobal.net)

Secretary: Durand Stacy (durand.stacy@hitachienergy.com)

Attendance and status:

Last Name	First Name	Company	Status
Allison	Robert	Dominion Energy	Guest
Alexander	Anthony	Hitachi Energy	Guest
Arnold	Elise	SGB	Guest
Crockett	Daniel	Ameron	Guest
Cruz Valdes	Juan Carlos	Prolec GE	Guest
Debass	Sami	EPRI	Member
Del Rio	J. Arturo	HSP-US	Member
Dinh	Huan	Hitachi Energy	Guest
Euvrard	Eric	RHM International	Member
Faur	Florm	Prolec GE	Guest
Fong	Sanford	Georgia Power	Guest
Giraldo	Orlando	H-J Family of Companies	Guest
Hull	Jesse	VTC	Guest
Jarosz	Patrycja	IEEE	Guest
Johnson	Reeve	Hitachi Energy	Guest
Kasonga	Mick	Oncor	Guest
Kazmierczak	Terry	HE	Guest
Kirchenmayer	Egon	Siemens Energy	Member
LaBean Jr	Bernard	Consumers Energy	Guest
Magela Jr	Geraldo	Siemens Energy	Guest
Middleton	Robert	RHM International	Member
Mubark	Abbas	Va Transformer	Guest
Muikulecky	Filip	Koncar Power Transformers	Guest
Orlando	Giraldo	H-J Family of Companies	Guest

Patel	Nirav	Yash Highvoltage	Guest
Patel	Poorvi	EPRI	Guest
Quinunes	Manuel	GE Vernova	Guest
Raymond	Tim	Inductive Reasoning	Guest
Reyes	David	Oncor	Guest
Riopel	Sebastien	Electro Composites ULC	Member
Rutledge	Chris	GE Vernova	Guest
Sarkinen	Garret	Xcel Energy	Guest
Schnider	Stefan	Reinhausen	Guest
Schott	Cody	H-J Family of Companies	Guest
Segovic	Dario	Koncar Power Transformers	guest
Skeik	Ahmad	Crosslink Technology	Guest
Spitzer	Thomas	City Transformer Service Co.	Chair

Last Name	First Name	Company	Status
Stacy	Fabian	Hitachi Energy	Secretary
Stockton	David	SBC	Guest
Szczechowski	Januaz	Reinhausen	Guest
Valentina	Valori	Hitachi Energy	Guest
Vermette	Yves	Electro Composites ULC	Member
Weatherbee	Eric	PCORE Electric	Member
Weisensee	Mathew	PacifiCorp	Guest
Whitton	Christopher	Hitachi Energy	Member
Yeboat	Kwnsi	GE Vernova	Guest
Young	Samuel	Hitachi Energy	Guest
Zambrano	Jose	Siemens	Guest
Zhaieng	Sbyuam	Siejuan Electric	Guest
Zhang	Shibao	PCORE Electric	Member

Zorco	Eva	Vash High Voltage	Guest

1

BUSHING SC MEETING

IEC Liaison Report - Spring 2025

IEEE PES TRANSFORMERS COMMITTEE

Location: Denver

Kurt Kaineder



2

SC 36A Team, Structure and Meetings

Role	Name	Term Of Office	NC
Chair	Mr Lars Jonsson	2026-12-31	SE
Secretary	Mrs Laura De Fina		IT

- Last General Meeting was held in Milan, Italy, on 15 June 2023
- **Next** General Meeting jointly with TC 36 in Beijing, China, on June 12, 2025.

Membership:

- 15 Participating Countries
- 24 Observer Countries

Experts:

- Total number of experts : 77 (11 IEEE, 1 US)
- Total number of records : 141



Working Groups

WG	Type	Description	Scope	Creation
JMT 9	Joint Maintenance Teams	DLMT: HVDC Bushings	To jointly revise the document IEC/IEEE 65700-19-03	2021-12-15
JWG 7	Joint Working Groups	Dimensional bushing standardization	To prepare the working draft of a Technical Report with the title LV-MV and HV Transformer bushings dimensional standardization.	2019-03-01
JWG 10	Joint Working Groups	Bushing Application Guide	To develop an International Standard on bushing application guide	2021-10-05
MT 5	Maintenance Teams	Maintenance Team for the revision of IEC 60137: Insulated bushings for alternating voltages above 1kV.	Revision of the standard IEC 60137 with review of the contents and extension of tables to cover new market technical requirements where necessary and possible.	2008-07-25
MT 6	Maintenance Teams	Bushings seismic qualification		2012-03-26
PT 63634	Project Team	General requirements for tap adapter of capacitance graded bushing	To generate general requirements for tap adapter of capacitance graded bushings	2025-02-18



Working Groups and related activities

JMT 9 36A/255/FDIS, IEC/IEEE 65700-19-03 ED2: Bushings for DC application
Circulation Feb. 7th, 2025, Closing March 21st, 2025

P-Members vote

P-Members Voting	P-Members In favour	In favour %	Criteria	Result
10	10	100	>=66.7%	APPROVED

All Votes

Total Votes Cast	Total Against	Against %	Criteria	Result
14	0	0	<=25%	APPROVED

Voting Result			
APPROVED			
Document 36A/255/FDIS			
Project : IEC/IEEE 65700-19-03 ED2			
IEC/IEEE 65700-19-03 ED2: Bushings for DC application			
Reference	Circulation date	Closing date	Downloads
36A/255/FDIS	2025-02-07	2025-03-21	
Compilation of Comments			
CC file			

- 1 editorial comment from Italy



Working Groups and related activities

JMT 9

36A/255/FDIS, IEC/IEEE 65700-19-03 ED2: Bushings for DC application

Circulation Feb. 7th, 2025, Closing March 21st, 2025

P-Members vote

P-Members Voting	P-Members In favour	In favour %	Criteria	Result
10	10	100	>=66,7%	APPROVED

All Votes

Total Votes Cast	Total Against	Against %	Criteria	Result
14	0	0	<=25%	APPROVED

Voting Result

APPROVED

Document 36A/255/FDIS

Project : IEC/IEEE 65700-19-03 ED2

IEC/IEEE 65700-19-03 ED2: Bushings for DC application

Reference	Circulation date	Closing date	Downloads
36A/255/FDIS	2025-02-07	2025-03-21	
Compilation of Comments			
CC file			

- 1 editorial comment from Italy



Working Groups and related activities

JWG 7

Dimensional bushing standardization linked to TC 14
(F. Mauri – IT)

- **IEC TS 63493-1:** Transformer bushings dimensional standardization – Part 1: Medium voltage bushings with Um from 12 kV up to and including 52 kV and Ir from 630 A up to and including 3150 A
 - Related documents: **IEC 36A/248/Q, 36A/253/CD, 36A/258/CC**
5 comments in total
 - A revised draft will be distributed as a DRAFT TECHNICAL SPECIFICATION (DTS) BY 2025-03-21
 - Forecast Publication: 2025-10
- The SC 36 A will agree how to proceed regarding the interchangeability criteria for the bushings removed from Part 1 during the next plenary meeting.



Working Groups and related activities

JWG 7 Dimensional bushing standardization linked to TC 14
 (P. Cardano - IT)
 Circulation January 24th, 2025, **Closing April 18th, 2025**

- **IEC TS 63493-2:** Transformer bushings dimensional standardization – Part 2: High voltage bushings
 - CD distributed Jan. 2025 document 36A/254/CD
 - Forecast Publication: 2026-03



Working Groups and related activities

MT 6 **IEC TS 61463** Bushings seismic qualification
 36A/259/AC Call for experts
 Circulation March 18th, 2025, Closing **May 16th, 2025**

- Mr. Paolo Cardano (IT), convenor of MT6, has reviewed the document together with the experts who have identified the following proposals for revision (partly see below):
 - Ground acceleration levels (§6.1): discussion on the present ones and possible introduction of a performance level.
 - Vertical acceleration as percentage of the horizontal one: (now 50%, §6.1, other Standards with different values to be reviewed).
 - Superelevation K: calculation methods and values if unknown (§6.2): new possible increased value, dependency on the bushing rating or on other parameters.
 - Static calculation general review:
 - Natural frequencies and damping tables, got from experience, for bushings equipped with porcelain and composite insulators: general review, completion of the tables, thanks to the present wider understanding of bushing's behavior, especially with composite insulators (§7).
 - Modal analysis: superimposition method (§8.2 and §8.3): review and clearer definition.
 - Spectra definition (9.1.6) and possible plateau extension as a function of natural frequency.
 - Test methods (9.1.7): discussion of the present possibilities (static calculation, simulation and test for all the ratings).
 - Better specification of the simulation method: when it is valid and how to validate it.
 - Combination of stresses (§10.1):
 - Test evaluation -methods and acceptance criteria (§10): clearer definitions, evaluation methods (with bending tests, with stress comparison in the insulators or in the most critical parts, etc.).
 - Center clamped bushings (Annex E): clearer definition of acceptance criteria.
 - Direct molded bushings: test evaluation and acceptance criteria.



Working Groups and related activities

- **MT 5** Maintenance Team for the revision of **IEC 60137**: (Lars – SE)
Insulated bushings for alternating voltages above 1kV.
Start the revision work of IEC 60137 with Call of experts
(36A/250/AC).
The work will start 2025.
- **JWG 10** Bushing application guide (J-C Riboud - FR)
WG is working on the document Part 1: Bushing selection
and installation (**IEC 63548-1**)
CD expected 2025-12



IEEE PES TRANSFORMERS COMMITTEE

DIELECTRIC TEST SUBCOMMITTEE

The meeting was held at the Hyatt Regency, Denver, Colorado, USA

Dielectric Tests Subcommittee		
Chair: Poorvi Patel	Vice-Chair: Thang Hochanh	Secretary: Diego Robalino
Room: Centennial DE	Date: Wednesday, March 26, 2025	Time: 11:00 am to 12:15 pm
Total DTSC Members: 157	Members present at the meeting: 109	Attendance recorded (QR+roaster): 247
Guests present: 138	Membership requested: 37	Membership accepted: 25
Members moved to Guest Status: 17		

Chair's Remarks

The SC Chair welcomed members and guests to the fall 2024 meeting in St. Louis, Missouri.

Five sets of the SC roster were distributed for attendance record. SC Secretary requested unanimous approval to record the meeting for the sole purpose of minutes reporting. None are against it, and the meeting is recorded (only voice no video).

The use of QR code has been implemented for easier management of attendees list.



Before presenting the agenda, the list of DTSC members was displayed.

First, SC Chair reviewed policies and procedures according to IEEE SA. It was stated the need to identify potential essential patent claims. DTSC members and guests are reminded to inform SC Chair, SC Secretary or IEEE SA representative for

our SC (Patrycja Jarosz, +19087268288, p.jarosz@ieee.org) of potential patent claims. Copyright policies, participation behavior, compliance with all applicable laws, including antitrust and competition laws.

It was requested to all attendees approach the microphone for questions and comments during the meeting stating name and affiliation.

Future events:

IEEE DEIS Electrical Insulation Conference 2025	June 8 – 12, South Padre Island, TX
IEEE PES General Meeting	July 27 – 31, Austin, TX
IEEE PES Transformer Committee Meeting Fall 2025	Oct. 19 - 23, Bonita Springs, FL
IEEE PES Transformer Committee Meeting Spring 2026	March 22-26, Fort Worth, TX
IEEE T&D	May 4 – 7, Chicago, IL

Next, SC Chair requested all TF and WG leaders to submit minutes on or before April 09, 2025 including revised and updated attendance list. The information to be sent to SC Secretary via e-mail (diego_robolino@ieee.org). The information must be consolidated and submitted to the Main Committee by May 08, 2025. Also, a reminder was made for any online meeting happening in-between the in-person meetings also should keep a recorded attendance and minutes.

- **ADCOM highlights**

Patrycja Jarosz's contact information was provided for guests and members if questions arise.



Patrycja Jarosz



p.jarosz@ieee.org



+1 9087268288

Regarding WG and SC officer Training, it has become optional but highly recommended. IEEE SA's Antitrust, Competition, and Commercial Terms Policies remain mandatory for Standards Committee / Working Group Officers to complete within 90 days of appointment.

Training link: <https://iln.ieee.org/Public/ContentDetails.aspx?id=AE404C2328DA4A39AAD7AB5117681F05>

- **Optional** training that all current and future officers need to complete
- **Mandatory**- IEEE SA's Antitrust, Competition, and Commercial Terms Policies training shall be performed after appointment
 - Standards Committee/Working Group Officers within 90 days of appointment
 - Training is on demand
- **Recommend everyone to go through the training**

Memberplanet

- Testing is ongoing with no target date when it will be released.

List Serv-email address

- The SC Chair indicated that all WG and TF leaders are requested to send the list of members or non-members to Patrycja to be updated in **MyProject**., she will generate the email address and set you up as admin to be able to change the list as well. Let her know if you want one email address for Members and Guests
- **PAR Changes, Modification and Extension**

- Must have WG Approval
- Must have SC Approval

• **Status of Active Standards**

Project	Title	Valid until	PAR Status
C57.127	Guide for the Detection of Acoustic Emissions from Partial Discharges	2028	PAR 2028
C57.160	Guide for the Elec. Measurement of PD in HV bushings and Instrument Transformers	2033	WG inactive
C57.113	Recommended practice for PD Measurement Power	2034	WG Inactive
C57.98	Guide for Transformer Impulse Tests	2021	PAR 2026 Ballot Process
C57.138	Recommended Practice for Routine Impulse Tests for Distribution Transformers	2026	PAR 2028
C57.161	Guide for DFR Measurements	2028	PAR 2028
C57.168	Low-Frequency Test Guide	2034	WG inactive
C57.12.200	Bushing Dielectric Frequency Response Guide (ENTITY WG)	2032	WG inactive

Next, NesCom/RevCom meeting dates and deadlines were reviewed.

Standard Board Meeting	Submittal Deadlines
26 th March 2025	
7 th of May 2025	28 th of March 2025
18 th of June 2025	9 th of May 2025

SC Secretary's Report

SC Secretary brought back the attention to the use of the QR code, and some answers were recorded indicating that not all attendees were aware of their status (member or guest).

Agreed to display the members' names before scanning the QR code. Lesson learned. It is part of using an alternative system.

Sign-in sheet explanation. Emphasizing on where to sign attendance and where to request membership.

- Total Attendees to DTSC F24 meeting: **213**
 - o Total Members attended: 104 (out of 155)
- Requested Membership: 34
 - o Rejected Membership: **17**
 - o Approved Membership: **17**

First Name	Last Name	First Name	Last Name
Jason	Beaudoin	Marta	Muñoz
Jeffrey	Door	Rakesh	Patel
Saif	Hossain	Eric	Schleismann
Yeounsoo	Kim	Jonathan	Tan
Zan	Kiparizoski	Scott	Thomas
Fernando	Lagos	Krishnamurthy	Vijayan
Luc	Loiselle	Joe	White
José Luis	Machain	Terry	Wong
		Fei	Yang

- Total Members for Fall 2024 meeting: **156**
- Required for Quorum: **79**
- Requirements to become a DTSC Member:
 - o Attend **3** out of the last **5** DTSC meetings

A list of members was presented to the audience to establish a quorum during this meeting and QR code was displayed. Looking at the list of members, we requested to raise hands for headcount.

The headcount was completed with **over 90** members attending the meeting. **Therefore, the quorum was achieved.** The final review will be carried out against roster signatures and QR code data.

- o **Quorum, Approval of Minutes, and Agenda**

Once quorum was established, SC Chair requested a motion to approve the agenda for today's meeting:

- Motion by Dan Sauer, second Evgenii Ermakov.
- No objection to the unanimous approval of the agenda for Spring 2025 meeting, hence approved.

Chairperson requested a motion to approve the Fall 2024 minutes from Vancouver meeting including revisions made later to its publication:

- Motion by Peter Werelius, second Sami Debass
- No objection to the unanimous approval of the minutes for the Fall 2024 meeting, hence approved.

Attendance Summary

	By QR & R
Total Attendees	247
Total # Of Members	157
Members Present	109
Quorum Present	YES (69.4%)

SC Discussions and Motion passed.

New Business:

1. Entity Par- Guide for testing Partial discharge acoustic image of electric power equipment (Detlev Gross)
 - Already a guide C57.127 - a section on air-borne acoustic signals captured with the dish-type acoustic detectors. In this section we plan also to cover now the so-called acoustic cameras using the MEMS arrays for beam forming. The aim here is to make sure that there is no external source of the PD and in case identify the external source.
 - Encourage the entity PAR to join this WG. The Guide covers the application on transformers as per this proposal, but of course not the application on overhead cables.
 - For the application on overhead cables and other substation equipment shall then be hosted by another PES committee Tauhid Ansari – indicated that to his TF in the continuous revision of C57.12.00 a topic was identified not to belong to this task force and it is brought up to the DTSC.
 - Detlev Gross informs about the scope of the Entity PAR
 - Stephen Shull – Liasion – indicated they are waiting on response regarding scope. Recommends taking ownership of this work and accept this PAR.
 - **Motion to approve this PAR and integrate it into the DTSC**
 - Motion by Dan Sauer, second Sami Debass
 - Jeff Britton calls for clarification. Motion is not to accept the PAR but to oversight the process
 - Chair accepts clarification and request unanimous approval. Hearing no objections **Motion passes.**
 - An error in formula in external clearance section- should be corrected before next revision of C57.12.00.
 - Should be BSL and not BIL

$$\text{BSL} \quad \cancel{\text{BIL}} = \text{CFO} \times \left(1 - 1.28 \times \frac{\sigma_f}{\text{CFO}} \right)$$

-
- Ajith Varghese indicated that this is only a typo and correction is requested.
- **Motion to make necessary corrections in the next version of C57.12.00**
 - Motion by Dan Sauer, second Sanjib Som
 - Hearing no objections **Motion passes.**

Old Business: No old business

Motions during the DTSC meeting:

- **TF Revision to Low Frequency Dielectric Tests**

Motion requested by Ajith Varghese

Request SC approval for following changes to C57.12.90 to be incorporated into next revision of Test code.

- Delete subclause 10.5.1
- Add below shown subclause and text to

10.7 Induced-voltage test for distribution and class I transformer and

10.8 Induced-voltage test for class II transformer

10.7.X Induced-voltage test for transformers with series or multiple connection

Transformers with windings that have multiple connections (series-parallel or delta-wye) and whose connections each have a nominal system voltage of 25 kV or above shall receive two induced tests, one in each connection. If more than one winding has such multiple connections, then the connections in each of the windings shall change between the tests, and the manufacturer shall determine the relative connections for each test. The test voltage and shall be contingent on the system voltage level of the high-voltage winding for the connection being tested. In all cases, the last induced test shall be for the connection with the highest test voltage

10.8.X Induced-voltage test for transformers with series or multiple connection

Transformers with windings that have multiple connections (series-parallel or delta-wye) and whose connections each have a nominal system voltage of 25 kV or above shall receive two induced tests, one in each connection. If more than one winding has such multiple connections, then the connections in each of the windings shall change between the tests, and the manufacturer shall determine the relative connections for each test. The test voltage and shall be contingent on the system voltage level of the high-voltage winding for the connection being tested. In all cases, the last induced test shall be for the connection with the highest test voltage

- The motion was seconded by Dan Sauer.
- No discussion and no additional comments.
- No objection to unanimous approval of the motion, **therefore Motion is approved.**

- **TF Revision to Impulse Tests**

Motion requested by Dan Sauer

Request SC approval to survey the updated wording for voltage waveforms in the TF and the SC

- Motion seconded by Francis Mills.
- No discussion and no additional comments.
- No objection to unanimous approval of the motion, **therefore Motion is approved.**

- **TF Survey to bushing Clearances**

Motion requested by Tauhid Ansari

Setup task force to go through all comments and make necessary changes to currently proposed changes to Sec 6.8 of C57.12.00

- Motion seconded by Sanjib Som.
- Steve Antoz suggests the TF to work virtually. Tauhid indicates that a group of people will be invited.
- Bruce Webb asked who will be in the group of people. Tauhid indicated that those who replied and Poorvi added that anyone willing to participate should be in that TF.
- No additional discussion and no additional comments.
- No objection to unanimous approval of the motion, **therefore Motion is approved.**

Taskforce and Working Group Reports

Reports are in the order presented during the meeting

TF Core Ground and Winding Insulation Resistance

Chair: Diego Robalino

Acting Secretary: Aniruddha Narawane

Monday, March 24, 2025.

Hyatt Regency, Denver, CO – Centennial H (3) 16:45 – 18:00

Minutes prepared by Aniruddha Narawane, Secretary

- The meeting called to order by the WG Chair at 16:45

Total TF Members: 48	Members present at the meeting: 25	Attendance according to sign in sheet: 103
Guests present: 33	Membership requested: 19	Membership accepted: 10
Members moved to Guest Status: 9		

- Attendance Summary**

	By Roster
Total Attendees	103
Total # Of Members	48
Members Present	25
Quorum Present	Yes (52.08%)

- Patent statement from IEEE SA presented to attendees
- IEEE SA Policies presented to attendees
- Welcome new members of this TF:

First Name	Last Name
Edwin	Betancourt
Gabriel	Delgado
Lorne	Gara
Roger	Hayes

Luc	Loiselle
Alberto	Sandoval
Risto	Trifunoski

- Meeting called to order by the chair at 4.45 pm.
- Patent claims and copyright shown – no issues or questions were raised.
- Total 27 out of 53 members were present, so quorum was established.
- Agenda for the meeting, and minutes for Vancouver and St. Louis meetings were approved unanimously.
- Chair presented the data for core to ground and frame to ground insulation tests conducted on various sizes of transformers ranging from 10 to 200 MVA.
- There were questions about the voltage levels used for tests, types of bushings used for ground, if frame was accessible for testing on a finished transformer.
- It was decided to add option of Frame to core test results in data collection template.
- Most commonly used bushings like Porcelain, Epoxy and thermoplastic type were also decided to be specified for ground connection.
- A question about the goal of task force was raised and chair explained that if the exercise results in an acceptable document, then placing it in C57.12.00, C57.12.90 or C57.152 can be recommended.
- After presentation of data and due discussions meeting was adjourned at 5.40 pm.

Attendance Record

First Name	Last Name	Affiliation
Isaac	Abdalla	HICO America
Mostafa	Agharahimi	Georgia Transmission Corp.
Mario	Alonso	Georgia Transformer
Mihir	Amin	Eaton
Tauhid	Ansari	Hitachi Energy
Stephen	Antosz	
Josh	Arias-Garcia	Midwest Electric Transformer Services
Onome	Avanoma	MJ Consulting
Duvier	Bedoya	Hitachi Energy
Josh	Bohrn	PacifiCorp
Garrett	Bradshaw	Howard Industries
Josipa	Brekalo	KONCAR D&ST
Steven	Brzoznowski	BPA
John	Bule	DTE Energy
Jim	Cai	JSHP
David	Calitz	Siemens Energy
Alfredo	Carrizales	Prolec
Adriana	Cisco Sullberg	Salt River Project
Juan Carlos	Cruz Valdes	PROLEC GE
Gabriel	Delgado	Invenergy

Scott	Dennis	Hitachi Energy
Dumitru	Diaconu	Delta Star Inc
Jesse	Duffy	Nashville Electric Service
William	Elliott	AEP SWEPCO
Marco	Espindola	Hitachi Energy
Raymond	Frazier	
Lorne	Gara	Shermco Industries
Shawn	Gossett	Ameren Illinois
Luke	Grandbois	IFD Technologies Inc.
Benjamin	Guinand	Power Magnetics
Ravi	Gupta	Megger
Attila	Gyore	MIDEL and MIVOLT Fluids Ltd
Roger	Hayes	GE Vernova
Jean Carlos	Hernandez	
Benjamin	Hershberger	Midwest Transformer
Saramma	Hoffman	PPL
Thomas	Holifield	Howard Industries
Balaji	Janakiraman	Virginia Transformer corp
Chanmin	Jeong	HD Hyundai
John	John	Virginia Transformer Corp
Gary	King	Consultant
Zan	Kiparizoski	Howard Industries
Egon	Kirchenmaya	Siemens-Energy
Matija	Koprivnjak	Končar D&ST
Anton	Koshel	
Arvind	Kumar	Delta Star Inc
Fernando	Leal	PROLEC GE
Kanglin	Lee	Cheryong Electric
Mario	Locarno	
Geraldo	Magela junior	Siemens-energy
Kushal	Mahajan	Sungrow
Moses	Manzano	Hyosung HICO
Swapnil	Marathe	Megger
Alberto	Martinez	
Nader	Masoud	Central Moloney
Hossein	Nabi-Bidhendi	Itec
Aniruddha	Narawane	
Kris	Neild	Megger
Joe	Nims	Allen & Hoshall
Jonas	Oliveira	Hitachi
Cuauhtemoc	Ortiz	Niagara Power Transformers Corp
Juan	Ortiz	
Ajay	Palhatiya	Virginia Transformers corp
Parminder	Panesar	
Dean	Park	Hyosung Hico
Poorvi	Patel	EPRI

Rakesh	Patel	Hitachi Energy
Dipeshkumar	Patel	Hyper solutions
Monil	Patel	
Nitesh	Patel	Hyundai Power Transformers
Crystal	Qiao	Trench Canada
Laxman	Rapelly	
Jonathan	Reimer	FortisBC
Diego	Robalino	
Dinesh	Sankarakurup	Duke Energy
Armando	Santos	Prolec
Garret	Sarkinen	Xcel Energy
Nithin	Satheesh	Trench Limited
Salahuddin	Shaikh	
Walters	Shelby	Howard Industries
Steven	Snyder	Hitachi Energy
Markus	Soeller	Megger
Kyle	Steckschulte	AEP
Andrew	Steineman	Delta Star, Inc.
Sunny	Swarna	Virginia Transformer Corp
Marc	Taylor	JFE Shoji Canada
Andreas	Thiede	HIGHVOLT Dresden
Scott	Thomas	Hitachi Energy
Eduardo	Tolcachir	Tte Transformers
Risto	Trifunoski	Trench group
Pedro	Trujillo	Hyundai
Orlando	Urbinez	JST Power
Ajith	Varghese	Prolec GE Waukesha
Jason	Varnell	
Kannan	Veeran	
Pragnesh	Vyas	Cleveland Cliffs
David	Wallach	Duke Energy
Matt	Weiseusee	PacifiCorp
Peter	Werelius	Megger
Aparna	Xedantham	
Fei	Yang	Hitachi Energy
Shibao	Zhang	
Anna	Zhou	JST Power

TF Revision to Low Frequency Dielectric Tests

Denver, Colorado, USA Meeting – March 25, 2025 1:45-3:30pm MST

Chair: Ajith Varghese

Vice Chair: Markus Schiessl

Secretary: Jason Varnell

1. The meeting was called to order at 1:45 PM.
2. 103 individuals were in attendance. A quorum was achieved with 43 of 60 total members present. 19 individuals requested membership; however, only 11 were given member status based on attendance and participation and will be added after the S25 meeting. 6 Members that were not present had missed two out of the last three meetings and will be moved to guest after the S25 meeting, which means there will be 65 members.
3. A motion was made by Dan Sauer (Eaton) and seconded by Curtiss Frazier (Ameren) to approve the Spring 2025 meeting agenda. There were no objections to unanimous approval of the agenda. A motion was made by Dan Sauer (Eaton) and seconded by Curtiss Frazier (Ameren) to approve the Fall 2024 task force meeting minutes. There were no objections to unanimous approval of the Fall 2024 task force meeting minutes.
4. Old business
 - a. There was no old business.
5. New business
 - a. Recommendation from Jason Varnell (Doble Engineering) to add partial discharge calibration requirements into the body of IEEE C57.12.90 subclause 10.9.3 instead of simply referring to C57.113.
 - i. Discussions were generally favorable to review the criteria in C57.113 and to decide if any of the criteria should be revised or included explicitly in C57.12.90.
 - ii. Dan Sauer (Eaton) made a motion to form a sub-TF, which was seconded by Sanjib Som (PTTI). The motion passed. TF unanimously agreed to form a sub-TF with the following objective:
 1. Determine if the requirements from C57.113 should be moved directly into C57.12.90 subclause 10.9.3.
 2. Determine if the requirements from C57.113 are applicable and/or need to be changed. The sub-TF should confirm that there are no conflicts between recommendations for C57.12.90 and what is currently in C57.113.
 - b. Request from Ryan Musgrove (OG&E) to move requirements from IEEE C57.12.90 subclause 10.5.1 to subclauses 10.7 for Class I transformers and subclause 10.8 for Class II transformers. The request was made due to observed misinterpretations of its applicability to either class I or class II transformers since the requirements were not in subclauses 10.7 and 10.8, respectively.
 - i. Discussions were generally favorable to clarifying the requirements.
 - ii. A motion was made by Dan Sauer (Eaton) and seconded by Kris Zibert (Allgeier, Martin and Associates) to remove the text from C57.12.90 subclause 10.5.1, then to modify it

(see text below) and move it to subclause 10.7 for Class I Power Transformers and to also move it to subclause 10.8 for Class II Power Transformers. The motion passed unanimously. The TF chair is to present the text to DTSC for a vote for inclusion into the next revision of C57.12.90. The modified text for inclusion to subclause 10.7 and subclause 10.8:

1. Induced-voltage test for transformers with series or multiple connections

Transformers with windings that have multiple connections (series-parallel or delta-wye) and whose connections each have a nominal system voltage of 25 kV or above shall receive two induced tests, one in each connection. If more than one winding has such multiple connections, then the connections in each of the windings shall change between the tests, and the manufacturer shall determine the relative connections for each test. The test voltage and duration ~~(Class I—7200 cycle or Class II—one-hour test)~~ shall be contingent on the system voltage level of the high-voltage winding for the connection being tested. In all cases, the last induced test shall be for the connection with the highest test voltage.

6. A motion to adjourn the meeting was made by Dan Sauer (Eaton) and seconded by Tauhid Ansari (Hitachi Energy). The motioned passed unanimously. The meeting was adjourned at 3:00 p.m. The next meeting will be in Bonita Springs, Florida, USA at the Fall 2025 IEEE Transformers Committee Meeting.

Attendance Record (Membership Status After S25 Meeting)

Guest	Nabi	Almeida	Prolec-GE
Member	Tauhid Haque	Ansari	HITACHI ENERGY
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Member	Elise	Arnold	SGB
Member	Onome	Avanoma	MJ Consulting
Guest	Duvier	Bedoya	Hitachi ABB Power Grids
Member	Daniel	Blaydon	Baltimore Gas & Electric
Member	William	Boettger	Boettger Transformer Consulting LLC
Guest	Josh	Bohrn	PacifiCorp
Member	Alain	Bolliger	HV TECHNOLOGIES, Inc.
Member	Dominique	Bolliger	HV TECHNOLOGIES, Inc.
Member	Michael	Botti	Hyosung HICO
Member	Jeffrey	Britton	Phenix Technologies, Inc.
Guest	Steven	Brzoznowski	Bonneville Power Administration
Member	David	Calitz	Siemens Energy
Member	Juan	Carrizales	Prolec GE
Guest	Vivian	Chan	Hitachi Energy
Guest	Eric	Davis	Consultant
Member	Scott	Dennis	Hitachi ABB Power Grids
Guest	Eric	Elson	SDG&E
Member	Reto	Fausch	RF Solutions
Member	Raymond	Frazier	Ameren
Member	Eduardo	Garcia Wild	Siemens Energy
Guest	Shawn	Gossett	Ameren
Member	Bill	Griesacker	Consultant
Member	Detlev	Gross	Power Diagnostix Consult GmbH
Guest	Peter	Heinzig	Weidmann Electrical Technology
Member	Saramma	Hoffman	PPL
Member	Nick	Jensen	Delta Star
Member	Zan	Kiparizoski	Howard Industries
Member	Nihat	Kosedagi	ERMCO
Guest	Alexander	Kraetge	OMICRON electronics Deutschland GmbH
Member	Arvind	Kumar	Delta Star
Guest	Bernard	LaBean Jr.	Consumers Energy
Member	Mathieu	Lachance	Omicron
Member	Mark	Lachman	Doble Engineering Co.
Member	Fernando	Leal	Prolec GE
Member	Moonhee	Lee	Hammond Power Solutions
Member	Gabriel	Mamede	Siemens Energy
Member	Moses	Manzano	Hyosung HICO
Guest	James	McBride	JMX Services, Inc.
Member	Francis	Mills	Power Engineers

Member	Juliano	Montanha	Siemens Ltda
Member	Marta	Munoz	Hitachi Energy
Member	Hugo	Murillo	The H-J Family
Guest	Aniruddha	Narawane	Power Distribution, Inc. (PDI)
Guest	Kristopher	Neild	Megger
Member	Cuauhtemoc	Ortiz	NIAGARA POWER TRANSFORMERS
Guest	Monil	Patel	Pacific Gas & Electric Company
Guest	Nitesh	Patel	Hyundai Power Transformers USA
Member	Harry	Pepe	Phenix Technologies, Inc.
Guest	Bertrand	Poulin	Hitachi ABB Power Grids
Guest	Juan	Reyes Perez	Hitachi Energy
Member	Rodrigo	Ronchi	WEG-Voltran
Member	Hakan	Sahin	Virginia and Georgia Transformers
Member	Amitabh	Sarkar	Virginia Transformer Corp.
Member	Daniel	Sauer	EATON Corporation
Vice-Chair	Markus	Schiessl	SGB
Member	Eric	Schleismann	Southern Company Services
Member	Cihangir	Sen	Duke Energy
Guest	Kabir	Sethi	ABB AG
Guest	Aron	Sexton	Kinectrics
Member	Christopher	Slattery	FirstEnergy Corp.
Member	Sanjib	Som	Pennsylvania Transformer
Member	Kyle	Stechschulte	American Electric Power
Guest	H. Allen	Steele	TVA
Guest	Andrew	Steineman	Delta Star Inc.
Member	Janusz	Szzechowski	Maschinenfabrik Reinhausen
Member	Matthew	Sze	OMICRON electronics Corp USA
Member	Jonathan	Tan	Northern Transformer
Guest	Andreas	Thiede	Highvolt Dresden
Member	Eduardo	Tolcachir	TTE S.A.
Chair	Ajith	Varghese	Prolec-GE Waukesha
Secretary	Jason	Varnell	Doble Engineering Co.
Guest	John	Wagner	AEP
Member	David	Wallach	Duke Energy
Guest	Joshua	Watson	Nebraska Public Power District
Member	Fei	Yang	Hitachi Energy
Member	Kris	Zibert	Allgeier, Martin and Associates
Guest	Armando	Santos	Prolec-GE
Guest	Christian	Diaconu	Delta Star
Guest	James	Norton	Oncor Electric Delivery
Guest	Hector	Villa	Ecuatran SA
Guest	Garrett	Bradshaw	Howard Industries
Guest	Jesus	Sanchez Rodriguez	Vertiv

Guest	Cole	Van Dreel	ATC
Guest	Isaac	Abdalla	HICO America
Guest	Mihir	Amin	Eaton
Guest	Kushal	Mahajan	Sungrow
Guest	Dipeshkumar	Patel	Hyper Solutions
Guest	Gunja	Vijay	Powertech Labs Inc.
Guest	Benjamin	Guinand	Power Magnetronics
Guest	Anna	Zhou	JST Power
Guest	Dong Hyun	Jang	LS Electric
Guest	Jaeyong	Park	LS Electric
Guest	Heonsu	Kim	LS Electric
Guest	Scott	Thomas	Hitachi Energy
Guest	Hyounggon	Ryu	HD Hyundai
Guest	Juan	Ortiz	Reinhausen
Guest	Namtran	Nguyen	TT Electronics
Guest	Josipa	Brekaco	Koncar DST
Guest	Luca	Peuc	Koncar DST
Guest	Matija	Kopriunjak	Koncar DST

Task Force on Revision of Impulse Tests

Spring 2025 Transformers Committee Meeting

Task Force on Revision of Impulse Tests C57.12.00 and C57.12.90 (DiTests)

Hyatt Regency Denver Convention Center, Centennial DE

Tuesday, March 25, 2025, 8:09am

- Dan Sauer, Eaton Corporation, called meeting to order, as the Chair Sylvian Plante was unable to attend.
- Jason Varnell, Doble Engineering, volunteered to help and circulated blank roster sheets.
- Dan Sauer reviewed the patent slide requirements.
- Total members were reported as 52. Sauer noted that 27 members were needed for a quorum
- 30 members were counted and it was determined that a quorum was present.

MOTION - Steve Antoz (seconded by David Wallach) made a motion to approve the agenda. No objection was found to unanimous approval.

MOTION - Steve Antoz (seconded by Onome Avanoma) made a motion to approve the previously circulated minutes from Fall 2024. No objection was found to unanimous approval.

- Discussion was undertaken of survey results related to C57.12.90 sections 10.3.4.1 and 10.4.3.2 (Oscillograms). A total of 47 responses were received from a pool of both members and guests. Results were shared by Sauer in spreadsheet form, via recital of each line of comments. There were two *disapprove* responses, constituting a small fraction of respondents. Comments relating to comparison of waves were made by:
 - Steve Brzoznowski, BPA
 - Dave Wallach, Duke Energy
 - Jim McBride, JMX Services
 - Jason Warnell, Doble
 - John Sam, Duke Energy
 - Onome Avanoma, Independent Consultant

MOTION – Curtis Frazier, Ameren (seconded by Matt Weisensee, PacifiCorp) made a motion to survey the working group and task force for feedback on the latest language.

Old Business - A topic was presented by Sauer and determined to be closed.

- New Business – Jim McBride reported on an instance in which a customer was not seeing sufficient resolution to overlay impulse test currents and diagnose turn-to-turn faults. There is some question about whether the ability to detect turn-to-turn faults exists for all types of impulse testing. Jim suggested that routine impulse testing should not be a higher requirement than normal Lightning impulse testing. Comments provided by:
 - Dan Sauer, Eaton Corporation
 - Jim McBride, JMX Services
 - Bertrand Boulin, Hitachi Energy
- The Three commenters agreed to work together to generate language on this topic that can be surveyed to the task force.
- Al Traut, Howard Industries raised a topic regarding which tests apply to which size/type of transformers. C57.12.36 was noted as being related.

MOTION - Fernando Prolec, (Matt, Weisensee, PacifiCorp) – to adjourn. No objection heard to unanimous approval.

Attendance Record

Isaac	Abdalla	
Diego	Alvez	Hico America
KyungChan	An	Hyosung
Onome	Avanoma	MJ Consulting
Duvier	Bedoya	Hitachi Energy
William	Boettger	Boettger Transformer Consulting LLC
Alain	Bolliger	HV TECHNOLOGIES, Inc.

Dominique	Bolliger, Ph.D.	HV TECHNOLOGIES, Inc.
Garrett	Bradshaw	Howard Industries
Jeffrey	Britton	Phenix Technologies, Inc.
Steven	Brzoznowski	Bonneville Power Administration
David	Calitz	Siemens Energy
camilo	casallas	
Vivian	Chan	Hitachi Energy
Olivia	Cordova	Bureau of Reclamation
Eric	Davis	Consultant
Luiz	de Oliveira	Hitachi Energy
Scott	Dennis	Hitachi Energy
Duamiru	Diaconu	Delta Star
Iuc	Dorpranns	Royal SMIT Transformers
Eric	Elson	
Reto	Fausch	RF Solutions
Marcos	Ferreira	FEMA
Raymond	Frazier	Ameren
Eduardo	Garcia Wild	Siemens Energy
Orlando	Giraldo	THE H-J FAMILY OF COMPANIES
Alireca	Gorzin	
Shawn	Gossett	Ameren
Kevin	Hampton	Siemens Energy
Peter	Heinzig	Weidmann Electrical Technology
Giovanni	Hernandez	
Saramma	Hoffman	PPL
Thomas	Holifield	Howard Industries
Miljenko	Hrkac	Hitachi Energy
Donghyun	Jang	LS Electric
Sukin	Jang	Iljil Electric
John	John	Virginia Transformer Corp.
Verin	Juchen	Hitachi Energy
Heonsu	Kim	LS Electric
Arvind	Kumar	Delta Star Inc
Bernard	LaBean Jr	Consumer Energy
Mark	Lachman	Doble Engineering Co.
Fernando	Leal	Prolec GE
Ricardo	Lopes Mamede	
Gabriel	Mamede	Siemens Energy
Moses	Manzano	Hyosung
Alberto	Martinez	
Nader	Masoud	Central Moloney
James	McBride	JMX Services, Inc.
Pat	McLaughlin	PECO Energy Company
Francis	Mills	Power engineers
Juliano	Montanha	Siemens Energy
Mario	Morioma	Georgia Transformer

Marta	Munoz	Hitachi Energy
Fredy	Murcia	Siemens Energy
Ali	Naderian	Consultant
patel	nitesh	
Daniel	Obregon	Tubos Trans Electric S.A.
Cuauhtemoc	Ortiz	Niagara Transformer Corp
Ajay	Palhuhter	Virginia Transformer Co
Manan	Pandya	Siemens Energy
Dern	Park	Hyosung
Poorvi	Patel	Epri
Harry	Pepe	Phenix Technologies, Inc.
Bertrand	Poulin	Hitachi Energy
Jonathan	Reimer	FortisBC
Juan	Reyes	Hitachi Energy
Rodrigo	Ronchi	WEG Transformers USA Inc.
Hyoumggon	Ryu	HD
Hakan	Sahin	Virginia/Georgia Transformer
Jesos	Sanclez Rodriguez	Vertis
Armando	Santos	Prolec GE
Daniel	Sauer	EATON Corporation
Eric	Schleisman	Southern Company Services
Cody	Schott	The H-J Family of Companies
Alfons	Schrammel	Siemens Energy
Danio	Segonic	Siemens Energy
Aron	Sexton	Kinectrics
Salahuddin	Shaikh	NRG Energy
Mike	Shannon	REA Magnet Wire
Christopher	Slattery	FirstEnergy Corp.
Kyle	Stechschulte	American Electric Power
Hampton	Steele	Tennessee Valley Authority
Andrew	Steineman	Delta Star Inc.
Jonathan	Tan	
Andrewa	Thiede	
Scott	Thomas	Hitachi Energy
Leonard	Torchin	PSE&G
Alan	Traut	Howard Industries
Pedro	Trujillo	Hyundai Electric
Nidzar	Turcinhodzic	Siemens Energy
Jason	Varnell	Doble Engineering Co.
kannan	veeran	
Yues	Vermette	Hubbell
John	Wagner	
David	Wallach	Duke Energy
Eric	Weatherbee	PCORE Electric
Matthew	Weisensee	PacifiCorp

Fei	Yang	Hitachi energy
Hongzhi	Zhang	Hitachi Energy
Waldemar	Ziomek	PTI Transformers

TF Clearance Between Bushings (Virtual)

Tauhid Ansari
Unapproved Meeting Minutes

Survey On Review of Section 6.8 – Dielectric Clearance

Performed two virtual meetings submitting a survey.

Participants	422		
Member	164		
Guest	258		
Result		% of Total Participants	% of total response
Accept with Comment	11	2.6%	9.6%
Accept	81	19.2%	70.4%
Reject with Comment	16	3.8%	13.9%
Reject	0	0.0%	0.0%
Abstain	7	1.7%	6.1%
Total	115	27.3%	

Comments came up in different ways.

A motion will be addressed to the SC for approval of setting up a TF to go through all survey comments.

WG Revision of C57.161 “Guide for Dielectric Frequency Response Measurements”

WG Chair:	Evgenii Ermakov (Hitachi Energy – Sweden)
Vice-Chair:	Ismail Guner (Hydro Quebec – Canada)

Secretary:	Diego Robalino (Megger – USA)		
Meeting Location:	Meeting in room Centennial H at the Hyatt Regency, Denver, Colorado		
Meeting Date:	March 24, 2025	Meeting Time:	13:45 – 15:00

This is the second meeting of this working group. WG Chairman started the session at 13:45 and welcomed all attendees and participants. Those who requested membership during the first meeting were all approved.

Total WG Members: 42	Members present at the meeting (QR code): 23	Members present at the meeting (Roster + QR): 23
Guests present: 39	Attendance M&G (QR code): 54	Attendance M&G (Roster + QR): 62
Members moved to Guest Status: N/A	Membership requested: 8	Membership accepted: 8

- WG Chair indicated that this is the second meeting of this WG and during the previous meeting four task forces were created.
- This meeting focuses on an update from each of the task forces
- The agenda was presented
- Attendance is verified using QR code and rosters. Chair requests attendees to register attendance preferably using the QR code.
- Members are requested to stand up for headcount. Listed 42 members.
- Recording of the meeting is requested to the attendees – hearing none, recording is approved for the sole purpose of writing minutes.
- Unapproved minutes from F24 were presented, not able to approve without quorum.
- Patent statement from IEEE SA presented to attendees
- IEEE SA Policies presented to attendees
- IEEE SA copyright policy is read to attendees
-
- Report from Task Force leaders
 - Task Force 1 – Revision of Chapter 4
 - Ron Hernandez – Overview of the overall test
 - Two meetings held so far (January and February)
 - Revision of the use of DFR to include reactors
 - Theoretical basis – going through editorial work.
 - Edit table 2 – focus on the role of the analysis and the objectives of failure modes.
 - Modify the test of the algorithm – expanding the description of the algorithm.
 - Adding a figure for reactors
 - Task Force 2 – Revision of Chapters 5 & 6
 - Peter Werelius – thorough reading of Ch 5 & 6. Suggestion that chapter 5 and 6 are in good shape.

- Suggestions were sent to other members of the group to make comments.
- Task Force 3 – Revision of Chapter 7
 - Poorvi Patel – Carried out three virtual meetings looking at the analysis part.
 - Working on the use of CH for reactors
 - Looking at the types of fluids to be included inclusive ester fluids.
 - Question from the group to make sure there is no duplication of efforts specially with chapter 1. Open to discuss with other TF leaders.
 - Peter Werelius commented that he and his team have recently worked in the area of ester fluids. He indicated this is not an easy topic and we should be careful about recommendations.
 - Poorvi Patel is looking at some guidelines, maybe not as deep as the recommendations made for mineral oil. Calculate moisture is difficult.
 - Charles Sweetser, he would like to contribute, maybe now too early and in 10 years we may know more.
 - Chair suggests to look at cases from the group. Include state-of-the-art in the guide.
 - Tauhid Ansari asks about dew point correlation. Dew point seems to measure lower moisture than DFR.
 - Poorvi Patel indicates that it is important to know the difference between doing Dew Point vs DFR.
 - Diego Robalino brought to the attention that differences between those methods is already stated in C57.162.
 - Poorvi would like to see limit values and what to do about that.
 - Ron Hernandez mentions about C57.166 to be published this year and has moisture limits stated. Ron is corrected and pointed to C57.162. After clarification, it is mentioned that a table has been added in the document for DFR limits.
 - A statement was made that C57.162 has not yet been published and it is mineral oil only.
 - One last question – if 162 has limits for DFR, how is that separated. Chair responds he has no comments.
- Task Force 4 – Revision of Annexes, Literature and Case Studies
 - Ismail Guner was not able to travel from Canada.
 - Diego Robalino is requested to report in Ismail's absence.
 - The TF is trying to collect case studies. None gathered so far in the last two meetings. Request open to all the attendees to share if there is an interesting case study.
 - We are going through the bibliography
 - Poorvi asking to send a blast e-mail to the group requesting files as well as on reactors.
 - Charles Sweetzer mentions that in his TF there is a need to include issues like core laminations or another failure mode. Also mentions the need to show hook-up diagrams to include CH connections.
- No more questions about the progress of the Task forces
- New business
 - No new business addressed

- Chair looks again for quorum
 - Quorum reached
 - Secretary looks for the Table referred in the discussion from the balloting process of C57.162
 - Motion to approve agenda
 - o Motion by Sami Debass, second P. Papet
 - o Agenda is approved unanimously
 - Motion to approve the minutes from Fall 2024 (st. Louis meeting)
 - o Motion by Peter Werelius, second Sami Debass
 - o No discussion
 - o Minutes approved unanimously
 - Open floor to attendees:
 - o M. Locarno – follows Poorvi’s comment about a DFR guide for Instrument Transformers, he would like to know how much of the work of this WG could be part of the new proposed guide.
 - o Diego Robalino indicates that probably a good 30 to 40 % could be shared from this document. Theoretical probably closer to what the HV bushing DFR guide has but connections and interpretation is quite different.
 - o Ron Hernandez identified Table 12 in section 10.4.4. in the recirculated version of C57.162. The group to verify that and have discussion.
 - o Evgenii Ermakov – Created a workspace to share the information and keep updates of minutes and TF reports.
 - o Mario Locarno asked how to access workplace. Chair to clarify with Patycja.
 - o Bernard Poulin asks for guidance on where to measure and why not. Peter also commented on the challenges.
 - o QR code shows ~ 46 attendees but there is ~ 55 in the room
 - o Peter Werelius – might be new business to mentions conditions where “recommended” connections are not feasible. Also on reactors with access to the core. Peter has lots of measurements to discuss from Middle East.
 - Chair suggest to have cases to illustrate these type of uncommon situations.
- Motion to adjourn the meeting
- Motion by Peter Werelius, second Sami Debass.
- Meeting adjourned.

Attendance List

Role	First Name	Last Name
Guest	Mario	Alonso
Guest requesting membership	Tauhid	Ansari
Member	Onome	Avanoma
Guest requesting membership	Garrett	Bradshaw
Member	Sudip	Chanda

Guest	Murray	David
Member	Sami	Debass
Member	Gabriel	Delgado
Guest	Eric	Elson
Chair	Evgenii	Ermakov
Member	Marco	Espindola
Guest	Kyle	Feaster
Guest	Marc	Foata
Guest	Lorne	Gara
Guest	Rob	Ghosh
Member	Alireza	Gorzin
Guest requesting membership	Matthew	Greenhaw
Guest requesting membership	Roger	Hayes
Member	Ronald	Hernandez
Guest	Jean Carlos	Hernandez-Mejia
Guest	Braxton	Jones
Guest	Laszlo	Kadar
Guest	Sheldon	Kennedy
Guest requesting membership	Arvind	Kumar
Guest	Bernard	LaBean Jr
Guest	Aswini	Labh
Guest	Mathieu	Lachance
Guest	Rapelly	Laxman
Member	Mario	Locarno
Guest	Gabriel	Mamede
Member	Kumar	Mani
Member	Swapnil	Marathe
Guest	Logan	Merrill
Member	David	Murray
Member	Ali	Naderian
Guest	Kris	Neild
Guest	Rudolf	Ogajanov
Guest requesting membership	Juan	Ortiz
Guest	Parminder	Panesar
Guest	Dwight	Parkinson
Member	Poorvi	Patel
Member	Rakesh	Patel
Guest	Bertrand	Poulin
Secretary	Diego	Robalino
Member	Rodrigo	Ronchi
Member	Mickel	Saad
Guest requesting membership	Garret	Sarkinen
Guest	Markus	Soeller
Guest	Jonathon	Stauffer
Member	Charles	Sweetser
Member	Matthew	Sze
Guest	Jonathan	Tan
Guest	Andreas	Thiede

Guest requesting membership	Eduardo	Tolcachir
Guest	Yves	Vermette
Guest	Hector	Villa
Guest	Joshua	Watson
Member	Drew	Welton
Member	Peter	Werelius
Guest	Jiahao	Xie
Guest	Guang	Yuan
Member	Shibao	Zhang

TF C57.127- Revision of IEEE Guide for the Detection, Location and Interpretation of Sources of Acoustic Emissions from Electrical Discharges

Detlev Gross

Unapproved Meeting Minutes

Denver, March 25th, 2025, Room: Mineral Hall (A)

- Meeting Attendance

The working group met at 9:30 AM. 31 participants were in the room including 7 of the 17 members. Quorum was not met at that time but with more members entering the room, we were able to reach quorum at 9h45 with 9 members. Attendance list is shown at the end of the present minutes. Minutes from S24 and F24 were approved.

- Discussions

It was explained to the group that since our last meeting, we received comments and contributions. Some of the contributions are simple corrections that can be added to the document but others, more extensive, will require more efforts to be integrated in the document. Having that in mind, it was suggested that two task forces were created to integrate new contributions and to review the current document for corrections and/or additions. It is assumed that the task forces will meet virtually between our working group meetings to speed up the editing of the document.

Task force #1 :

- Scope: Chapters 1 to 5
- Task force leader : Mathieu Lachance
- Task force members : Matthew Sze, Mark Tostrud, Detlev Gross, David Larochelle

Task force #2 :

- Scope : Chapters 6 to the end
- Task force leader : Janusz Szczechowski
- Task force members : Markus Soeller, Alexander Kraetge, Aaron Sexton, Detlev Gross, David Larochelle

Considering our working group attendance is incomplete, the task forces creation will be announced by email so interested contributors can join and task forces meeting dates can be set.

The difficulty to reach quorum can partly be explained by the scheduling conflicts with two other working groups. Considering that one of these WG will be over soon, a scheduling change for our WG will not be requested.

- **Adjournment**

The meeting was adjourned at 9h55.

David Larochelle

- Attendance List

Complete name	Affiliation	Status
Ronny Doerr	SGB-SMIT Group	G
Eric Elson	San Diego Gas & Electric	G
Marc Foata	Reinhausen	G
Jean-Philippe Gagnon	Qualitrol	G
Luke Grandbois	IFD Technologies	G
Detlev Gross	Independent	C
Didier Hamoir	Transformer Protector Corp	G
Derek Hollrah	Burns McDonnell	G
Allen Hsiao	Shihlin Electric	G
Braxton Jones	SD Myers	G
Franjo Kelemen	Koncar Power Transformers	G
Alexander Kraetge	Omicron	M
Mathieu Lachance	Omicron	M
David Larochelle	NDB Technologies	S
Omar Mendez	Prolec GE	G
Fredy Murcia	Siemens Energy	G
Mark Newbill	Hitachi Energy	G
Ashwin Patmanaban Iyer	Transformer Protector Corp	G
Ion Radu	Hitachi Energy	G
Jonathan Reimer	Fortis BC	G
Yuri Rossini	Siemens Energy	G
Dario Segovic	Koncar Power Transformers	G
Aron Sexton	Kinectrics	M
Markus Soeller	Power diagnostix Systems	M
Janusz Szczechowski	Reinhausen	M
Matthew Sze	Omicron	M
Eduardo Tolcachir	TTE transformers	G
Mark Tostrud	Dynamic Ratings	M
Karsten Viereck	Reinhausen	G
Stanley Yeh	Shihlin Electric	G
AnnaBelinda Zhou	JST Power Equipment	G

WG C57.138 - Recommended Practice for Routine Impulse Tests

Unapproved Meeting Minutes

Chair:	<u>Hakan Sahin</u>	Vice-Chair	<u>Reto Faush</u>
Secretary	<u>David Wallace</u>	Percent Complete	<u>75%</u>
Current Draft Being Worked On:	<u>Draft not started</u>	Dated:	<u>n/a</u>
PAR Expiration Date:	<u>December 31, 2026</u>		
Meeting Date:	<u>25 March 2025</u>	Time:	<u>3:15pm</u>
Location:	<u>Denver, CO, USA</u>		
1) Attendance:	2) Members		<u>9</u>
3)	4) Guests		<u>23</u>
5)	6) Guests Requesting Membership		<u>5</u>
7)	8) Total*		<u>37</u>
* Attendance list for this meeting is shown at end of meeting minutes			

Meeting Minutes / Significant Issues / Comments:

Meeting was called to order at 3:15pm, March 25, 2025.

1. Administrative

- a. IEEE Patent Policy and Call for Patents
 - i. No comments from group.
- b. IEEE SA Copyright Policy
 - i. No comments from group.
- c. Review of agenda
 - i. No comments from group.
- d. Introductions of the attendees
 - i. Attendance sheets were passed out.
- e. Updated membership review and count for quorum
 - i. 34 people were in attendance with 8 out of 14 members present. Quorum was **achieved**.
 - ii. Fall_24 unapproved meeting minutes and Spring_24 agenda were approved with no objections from the members.
 - iii. 0 attendees requested membership.
- f. Jim McBride Motioned for approval of agenda, Chris Slattery seconded. No objections noted, motion passed.
- g. Chris Slattery motioned for approval of minutes, Jim McBride seconded. No objections noted, motioned passed.

2. Old Business

WG continued to review the document from clause 8.3.3, where we had stopped at the end of Fall_24 meeting, thru clause 8.3.2, which is where we will continue from during the Spring_25 meeting. Proposed changes approved during the meeting. Below is the summary of the review comments.

8.3.3 – The clause was presented. No comments were recorded on the clause.

8.4 – No comments were recorded on the clause.

8.4.1 – Dan Sauer said he used a winding resistance meter to demag the core before continuing to the next impulse shot. Hakan suggested keeping this as knowledge based.

8.4.2 – No comments were recorded on the clause.

9 – No comments were recorded on the clause.

Annex

A.1 - No comments were recorded on the clause.

A.2 – Note: check with the latest revision of C57.98 to ensure the statement (refer to 3.5 of C57.98) is still relevant.

A.3 – Hakan mentioned that we will have to cross check with 12.90 to make sure that everything still lines up. No other comments were recorded on the clause.

A.4 – No comments were recorded on the clause.

A.4.1 – No comments were recorded on the clause.

A.4.2 - No comments were recorded on the clause.

Figure A.6 should state “two-section layer winding”

Figure A.7 should state “two-section layer winding”

A.5 - No comments were recorded on the clause.

A.6 - No comments were recorded on the clause.

A.7 - No comments were recorded on the clause.

A.8 - No comments were recorded on the clause.

A.9 – Insert new point a. Use of a winding resistance meter to demag a unit is permissible. Dan Sauer made the motion, Reto Faush seconded. No objection. Motion passed

Change the note to state b, c and d.

WG is well on track to complete the review, revise the document per all approved revisions by the par expiration date of 12/31/2026

3. Next meeting: FALL 2025 MEETING BONITA SPRINGS, FLORIDA, USA October 19 - 23, 2025

4. Close of meeting

- a. Dan Sauer Motioned to adjourn, David Wallace seconded. No objections
- b. Meeting adjourned at 4:30 pm.

Submitted by: Hakan Sahin Date:_____

WG C57.138 Members and Guests list

Below membership as of Spring_25 meeting, which will be updated by the Fall-25 meeting

WG C57.138 Members and Guests list

Below membership as of Fall_24 meeting, which will be updated by the Spring-25 meeting

Abdalla	Isaac	Hico America	Guest	Lachman	Mark	Doble	Guest
Alonso	Mario	Georgia Transformers	Guest	Lambert	Jason	JST Power	Guest
Andrew	Larison	Hitachi Energy	Guest	Leal	Fernando	Prolec GE	Guest
Ansari	Tauhid	Hitachi Energy	Guest	Lee	Moonhee	Hammond power solutio	Guest
Avanoma	Onome	MJC	Guest	Lopes	Ricardo	EFACEC	Guest
Beaudoin	Jason	Weidmann	Guest	Mani	Balakrishnan	ITEC	Guest
Betancourt	Edwin	Siemens Energy	Guest	Masoud	Nader	Central Maloney	Guest
Binder	Wallace	Consultant	Guest	McBride	Jim	JMXHV	Member
Bolliger	Alain	HV Technologies	Member	Montanha	Juliano	Siemens Energy	Guest
Bolliger	Dominiques	HV Technologies	Guest	Moreno	Andre	Siemens Energy	Guest
Britton	Jeffery	Phenix Technology	Guest	Morris	Tim	Walton EMC	Guest
Carr	Deniss	GE	Guest	Morrow	Gianetta	Crane Aerospace	Guest
Costa	Florian	Corimpex	Guest	Murray	David	TVA	Guest
CruzValdes	Juan Carlos	Prolec GE	Guest	Nabi-Bidhendi	Hossein	ITEC	
Davis	Eric	Consultant	Guest	Ogajanov	Rudolf	Hitachi Energy	Guest
Derouen	Craig	ERMCO	Guest	Orozco	Polo	GE Grid Solutions	Guest
Diaz	Cesar	Eaton	Guest	Ortiz	Cuauhtemoc	Niagara Transformer Co.	Guest
Dolloff	Paul	EKPC	Guest	Owen	John	PowerTech Labs	Guest
Door	Jeffrey	H-J	Guest	Palhaliju	Ajay	Virginia Transformer	Guest
Elliott	William	Prolec GE	Guest	Parrales	Herman	Prolec GE	Guest
Eshenroder	Jacob	Burns and McDonnell	Guest	Patel	Poorvi	EPRI	Member
Fausch	Reto	RF Solutions	Member	Pepe	Harry	Phenix Technology	Guest
Fayad	Fadi	ASD	Guest	Plante	Sylvain	Hydro-Quebec	Guest
Flores	Hugo	Hitachi	Guest	Plisic	Goran	Siemens Energy	Guest
Frye	Richard	Eaton	Member	Posadas	Daniel	CELECO	Guest
Garcia	Eduardo	Siemens Energy	Guest	Pousset	Baptiste	Transformer Protection C	Guest
Gaytan	Carlos	Prolecge	Guest	Prince	Jarrod	ERMCO	Guest
Ghosh	Rob		Guest	Rhett	Chrysler	ERMCO	Guest
Givaldo	Orlando	HJ Family	Guest	Ronchi	Rodrigo	WEG	Guest
Greenhaw	Matthew	OG&E	Guest	Sahin	Hakan	Virginia and Georgia Transformer	Member
Gumand	Benjamin	Power Magnetis	Guest	Salinas	Fernando	Power Partners	Member
Hernandez	Giovannie	Virginia Transformers	Member	Saraf	Manish	Hammond Power	Guest
Himow	Monkin	Highvolt	Guest	Sarkar	Amitabh	VA Transformer	Guest
Hochanh	Thang	PowerTech	Guest	Sauer	Dan	Eaton	Member
Holifield	Thomas	Howard Inc.	Guest	Schott	Cody	H-J Family	Guest
Hopkinson	Phil	Hvolt	Member	Schrammel	Alfons	Siemens Energy	Guest
Nabi-Bidhendi	Hossein	ITEC	Guest	Scott	Dennis	Hitachi Energy	Guest
Jarosz	Patrycja	IEEE SA	Guest	Segovic	Dario	Siemens Energy	Guest
Jordan	Steve	TVA	Guest	seluargj	Pugual	VA Transformer	Guest
Katz	Nathan	Pacificorp	Guest	Sexton	Aron	Kinectrics	Guest
Kennedy	Gael	GRKennedy&Associates L	Guest	Shalabi	Jaber	Vantran	Guest
King	Gary	Howard Industry	Guest	Sharp	Michael	Trench, LTD	Guest
Knapp	Evan	Eaton	Guest	Slattery	Chris	First Energy	Member

Snyder	Steve	Hitachi Energy	Guest
Som	Sanjib	PTI, LLC	Guest
Steele	Hampton	TVA	Guest
Stretch	Kerwin	Siemens Energy	Guest
Sze	Matthew	Omicron Energy	Guest
Thibolt	Mike	PG&E	Guest
Thomas	Scott	Hitachi Energy	Guest
Tillery	Tim	Howard Industry	Guest
Tirado	Fernando	Prolec GE	Guest
Traut	Alan	Howard	Member
Tsai	Steve	JST Power	Guest
Verdell	Joshua	ERMCO	Guest
Vivian	Chan	Hitachi Energy	Guest
Walker	David	MGM Transformers	Guest
Wallace	David	Mississippi State University	Member
Washburn	Alan	Burns & McDonnell	Guest
Watson	Joshua	NPPD	Guest
Weisensee	Matt	Pacificorp	Guest
Weyandt	Paul	Schneider Electric	Guest
Winter	Alexandar	Highvolt	Guest
Yun	Joshua	Virgina Transformer Corp	Member
Zanwan	Anand	Siemens Energy	Guest
Zhang	Shibao	PCORE	Guest
Zhou	Anna	JST Power	Guest
Ziger	Igor	Kovear	Guest

TF for DFR on Instrument Transformers

Unapproved Minutes

**Meeting in Centennial F (3) at the Hyatt Regency Denver at Colorado Convention Center, Colorado,
11:00 AM – 12:15 PM, mars 25, 2025,**

Chair: Ismail Guner (Hydro Quebec – Canada)

Vice Chair: Ali Naderian

Secretary: Peter Werelius (Megger, Sweden)

This is the very first meeting of this task force (TF). TF chair was not able participate the meeting. Ali Naderian chaired the meeting. The meeting chair started the session at 11:00 and welcomed all attendees and participants.

The attendees were communicated that this is the first meeting of this TF and all are welcome to become members.

Total attendees: XX

Attendees requested membership: XX

The agenda was presented:

1. Welcome
2. Review of IEEE Rules and Procedures
3. Introduction
4. Background on the need for a guide on DFR on Instrument Transformers
5. Discussion on the existing content and presentations of case studies
6. Floor Discussion on possible content for a new guide
7. Survey based on discussions (*Slido*) by 11:55
8. Conclusions of the survey
9. Adjournment

The meeting chair presented two slides regarding IEEE-SA Copyright Policy followed by one slide about IEEE-SA Patent Policy.

Next, the rule of Task Force Membership was presented:

- Participants attending the first meeting may request membership. Requests should be indicated on the paper rosters.
- To become a member after the first meeting:
 - Attendance in 2 consecutive meetings
- To maintain membership:
 - Attendance in 3 out of the last 5 meetings

Introduction followed, that:

1. This task force aims to provide recommendation to the Subcommittee to develop a new “guide” (not a standard) for DFR Testing of Instrument Transformers.
2. Currently it does not fit well with any existing standard or guide
3. Two IEEE guides published on DFR measurements on transformers and bushings
 - C57.161-2018 - IEEE Guide for Dielectric Frequency Response Test
 - C57.12.200-2022 - IEEE Guide for the Dielectric Frequency Response Measurement of Bushings

In the “background” a case study from Australia was presented. Peter Werelius added that he had experience of cases where DFR was applied for similar cases in Sweden, France and The Netherlands.

Peter Werelius then presented the response of a dry oil-impregnated cellulose CT followed by a set of moist oil-impregnated cellulose CTs. The DFR response is very similar to the DFR response of an oil-impregnated bushing. He also presented the verification of the Arrhenius Temperature Correction that is recommended in C57.12.200.

The “floor” was opened for discussion:

Many persons contributed to the discussion: Zoltan Roman, Evgenii Ermakov, Thomas Sizemore, Charles Sweetser, Drew Welton, Poorvi Patel, Diego Robalino and Peter Werelius.

The conclusion from the discussion was that more data and case studies need to be collected before the TF can continue formulate a Title and Scope for a proposal form a WG. The aim is to collect data and case studies to be presented at the fall 2025 meeting in Florida. To be able fulfil that Peter Werelius asked everyone to please submit data/cases and/or be able present in at next meeting in Florida. Diego Robalino volunteered make a literature review to be submitted at next meeting in Florida.

Diego Robalino raised a motion adjourn the meeting. Evgenii Ermakov second it. The meeting adjourned at 12:15.

Liaison Report – HVTT

(J. Britton)

Standards Activity:

- IEEE 1122 – IEEE Standard for Digital Recorders for Measurements in HV Impulse Tests
 - Standard is Published (Jeff Britton)
- IEEE 510 – IEEE Guide for Electrical Safety in High-Voltage Testing
 - *PAR Expired and Resubmitted – Draft Standard is 90% completed(Jeff Hildreth)*
- IEEE P4.1 Implementation Guide for IEEE 4
 - *Draft 8 circulated for WG approval – Uncertainty Estimation and K-Factor(Bill Larzelere)*
- IEEE P454 – Guide for the Detection, Measurement and Interpretation of Partial Discharges
 - *Draft Development last meeting virtual in February (Glenn Behrmann)*
- IEEE P2426 – Guide for Field Measurement of Fast-Front and Very Fast-Front Overvoltages in Electric Power System
 - *Guide is Fully Published (Shijun Xie)*
- IEEE 4 – Standard for High-Voltage Testing Techniques
 - *Draft Development – Target to hold Monthly Virtual Meetings (Jeff Britton)*
- IEEE 316 – IEEE Standard Requirements for Direct Current Instrument Shunts
 - *PAR Approved in December 2024 - Expires Dec 31, 2028 (Switchgear Committee)*

Meeting Activities:

- All PSIM meetings are hybrid or fully virtual
- JTCM – Annually (All PSIM Groups)
- IEEE GM – Annually (Sensors and Electricity Metering)
-

Upcoming Meetings:

- HVTT Groups – GM, Austin TX (hybrid)
 - HVTT All groups – JTMC January 2026
-

WG to Investigate the Interaction between Substation Transients and Transformers in HV and EHV Applications and Revision of C57.142

**Denver, Colorado USA
Tuesday, March 25th, 2025
11:00 AM – 12:15 PM
Hyatt Regency - Centennial DE**

**Chairman – Jim McBride
Vice Chair – Xose Lopez-Fernandez
Secretary – Tom Melle**

- 1) Welcome and Chair's Remarks (it was mentioned the WG paper can be found at <https://ieeexplore.ieee.org/document/9161400>)
- 2) Circulation of Attendance Sheets. Quorum was achieved with 36 of 44 Members present. Guest attendance was 77 for a total of 113 attendees.
- 3) IEEE Patent Policy Slides – no patent claims
- 4) Approval of Agenda and Minutes from Last Meeting: Fall 2024 Minutes (motion by Phil Hopkinson / 2nd by Eduardo Garcia Wild) and Spring 2025 Agenda (motion by Marnie Roussell / 2nd by Phil Hopkinson) unanimously approved.
- 5) Reminder that the WG PAR extension is through December 31, 2025.
- 6) C57.142 Ballot and Comment Resolution for Draft 13 – Jim McBride:

The Chair stated that all comments have been resolved and asked for a motion to recirculate the ballot (motion by Hemchandra Shertukde / 2nd by Amitabh Sarkar). Weijun Li mentioned that a vote was not mandatory; however, the motion was unanimously approved. The Chair showed the slide containing the members of the CRG. During discussion a question from Phil Hopkinson, regarding resolution of the comment from Doug Edwards of the Switchgear Committee was asked: "Should we state the loading levels and chopping currents in the Guide?" The chair responded that this topic will be considered in future business.

Update from IEEE Switchgear Liaison Task Force to WG for Revision of C57.142 by David Caverly. The Switchgear Meeting will be held at the Wyndham Grand Orlando

Resort Bonnet Creek (Orlando, Florida) from April 6 – 11, 2025. No Task Force work is planned for the meeting, as all comments are complete. Mr. Caverly mentioned the creation of CIGRE A3.42 (new brochure for transformer failures) that may be of interest to the WG for liaison opportunities.

7) Mitigation Methods Task Force Update – Jim McBride / Phil Hopkinson

The Chair presented the Mitigation Methods summary and a list of TF Members. A tutorial is scheduled for Fall 2025 TC Meetings.

The WG plans to have ongoing discussions regarding the challenges of high-magnitude, high-frequency transients. It should be noted there are few (if any) factory tests to simulate these occurrences.

8) New Business – the Chair mentioned many recent occurrences of failures of transformers connected to solar farms as a possible future topic for the guide.

9) Next Meeting (Bonita Springs, FL October 19-23, 2025)

10) Adjournment at 11:33 AM

Meeting Attendance:

Role	Last Name	First Name	Company
Chair	McBride	James	JMX High Voltage
Vice-Chair	Lopez-Fernandez	Xose	Universidade de Vigo
Secretary	Melle	Thomas	HIGHVOLT
Member	Betancourt	Enrique	Prolec GE
Member	Boettger	William	Boettger Transformer Consulting LLC
Member	Britton	Jeffrey	Phenix Technologies, Inc.
Member	Caverly	David	Trench Limited
Member	Espindola	Marco	Hitachi Energy
Member	Frazier	Raymond	Ameren
Member	Garcia Wild	Eduardo	Siemens Energy
Member	Heiden	Kyle	EATON Corporation
Member	Hernandez	Giovanni	Virginia Transfomrer Corp.
Member	Hernandez	JC	Georgia Tech - NEETRAC
Member	Hoffman	Saramma	PPL Electric Utilities
Member	Hopkinson	Philip	HVOLT Inc.
Member	Hossain	Saif	Trench Limited
Member	John	John	Virginia Transformer Corp.
Member	Khan	Qasim	Georgia Tech - NEETRAC
Member	Kirchenmayer	Egon	Siemens Energy
Member	Lee	Moonhee	Hammond Power Solutions
Member	Li	Weijun	Braintree Electric Light Dept.
Member	Mani	Kumar	Duke Energy
Member	Montanha	Juliano	Siemens Energy
Member	Pepe	Harry	Phenix Technologies, Inc.
Member	Pointner	Klaus	Trench Austria GmbH
Member	Poulin	Bertrand	Hitachi Energy
Member	Ronchi	Rodrigo	WEG-Voltran
Member	Roussell	Marnie	Entergy
Member	Sarkar	Amitabh	Virginia Transformer Corp.
Member	Sharp	Michael	Trench Limited
Member	Tolcachir	Eduardo	TTE
Member	Varghese	Ajith	Prolec-GE-Waukesha
Member	Vir	Dharam	Prolec-GE Waukesha
Member	Yun	Joshua	Virginia Transformer Corp.
Member	Zhang	Shibao	PCORE Electric
Member	Ziomek	Waldemar	PTI Transformers
Guest	An	KYUNGCHAN	HYOSUNG
Guest	Arnold	Elise	SGB
Guest	Botti	Michael	Hyosung HICO
Guest	Bradshaw	Garrett	Howard Industries
Guest	Brodeur	Samuel	Hitachi

Guest	Calitz	David	Siemens Energy
Guest	Carrizales	Juan Alfredo	Prolec GE
Guest	Chan	Vivian	Hitachi Energy
Guest	Chorzepa	Jaroslaw	ABB Inc
Guest	Czernorucki	Marcos	Hitachi Energy
Guest	de Oliveira	Luiz	Hitachi Energy
Guest	Duffy	Jesse	Nashville Electric Service
Guest	Feaster	Kyle	Xcel Energy
Guest	Fernandez	Miguel	BELD
Guest	Fujimori	Alan	Romagnole
Guest	Griesacker	Bill	WGA
Guest	Gunja	Vijay	Powertechlabs
Guest	Heinzig	Peter	Weidmann Electrical Technology
Guest	Hollrah	Derek	Burns & McDonnell
Guest	Iman	Mike	MGM Transformer Company
Guest	Janakiraman	Balaji	Virginia Transformer
Guest	Jarosz	Patrycia	IEEE SA
Guest	Juchem	Kevin	ABB AG
Guest	Kim	Yeousoo	MEPPI
Guest	Klempner	Dmitriy	Southern California Edison
Guest	Koshel	Anton	Delta Star Inc
Guest	Kotbagi	Shrinivas	MGM Transformers
Guest	Kumar	Arvind	Delta Star Inc.
Guest	Leal	Fernando	Prolec GE
Guest	Levin	Aleksandr	Weidmann Electrical Technology
Guest	Lopes	Ricardo	Efacec Energia, SA
Guest	Martinez Mares	Alberto	WEG
Guest	Masoud	Nader	Central Moloney
Guest	Mills	Francis	POWER Engineers
Guest	Munoz	Marta	Hitachi Energy
Guest	Nambi	Shankar	Bechtel
Guest	Natale	Anthony	HICO America
Guest	Nims	Joe	Allen & Hoshall, Inc.
Guest	Panetta	Sergio	I-GARD Corp
Guest	<i>Parkinson</i>	<i>Dwight</i>	EATON Corporation
Guest	Patel	Nitesh	Hyundai Power Transformers USA
Guest	Patel	Monil	PG&E
Guest	Perez	Marcelino	PROLEC-GE
Guest	<i>Ploetner</i>	<i>Christoph</i>	Siemens Energy
Guest	Prevost	Tom	Weidmann
Guest	Raymond	Tim	Inductive Reasoning
Guest	Reimer	Jonathan	Fortis BC

Guest	Rossini	Yuri	Siemens Energy
Guest	Rutledge	Gris	GeVernova
Guest	Santos	Armando	Prolec GE
Guest	Saraf	Manish	Hammond Power Solutions
Guest	Sbravati	Alan	Hitachi Energy
Guest	Schiessl	Markus	SGB
Guest	Schleismann	Eric	Southern Company Services
Guest	Segovic	Dario	Koncar Power Transformers
Guest	Sethi	Kabir	Hitachi Energy
Guest	Shaikh	Salahuddin	Hitachi Energy
Guest	Shull	Stephen	BBC Electrical Service, Inc.
Guest	Snyder	Jason	FirstEnergy
Guest	Stechschulte	Kyle	American Electric Power
Guest	<i>Steele</i>	<i>Hampton</i>	Tennessee Valley Authority
Guest	<i>Steineman</i>	<i>Andrew</i>	Delta Star Inc.
Guest	Thiede	Andreas	HIGHVOLT Dresden
Guest	Torchia	Leonard	PSE&G
Guest	Trifunoski	Rusto	Trench
Guest	Trujillo	Pedro	Hyundai Power Transformers USA
Guest	Velasquez	Juan	Magnetron SAS
Guest	Wagner	John	AEP
Guest	Washburn	Alan	Burns & McDonnell
Guest	Watson	Joe	JD Watson & Associates
Guest	Watson	Joshua	Nebraska Public Power District
Guest	Weatherbee	Eric	PCORE Electric
Guest	Wong	Terry	Trench LTD
Guest	Xie	Jiahao	S&C Electric Company
Guest	Yeboah	Kwasi	GE Vernova
Guest	Yuan	Guang	Hitachi Energy
Guest	Zhou	Anna	JST Power

Record of Attendance to the DTSC meeting of March 26, 2025

Role	First Name	Last Name	Company
Guest	Ahmad	Skeik	Crosslink Technology
Member	Ajith	Varghese	Prolec GE Waukesha
Member	Alan	Sbravati	Hitachi Energy
Guest	Alan	Washburn	Burns & McDonnell
Request Membership	Alberto	Martinez	WEG
Member	Aleksandr	Levin	Weidmann Electrical Technology
Guest	Alex	Zeigher	Hitachi Energy
Request Membership	Alexander	Kraetge	OMICRON electronics Deutschland GmbH
Guest	Alfons	Schrammel	Siemens Energy
Member	Ali	Naderian	Potencia Partners
Member	Alireza	Gorzin	Black & Veatch
Member	Amitabh	Sarkar	Virginia Transformer Corp.
Guest	Amitkumar	Singh	Consolidated Edison
Guest	Anastasia	O'Malley	Consolidated Edison Co. of NY
Guest	Andreas	Kurz	
Guest	Andreas	Thiede	HIGHVOLT Dresden
Guest	Andrew	Larison	Hitachi Energy
Member	Andrew	Steineman	Delta Star Inc.
Member	Aniruddha	Narawane	EATON Corporation
Guest	Anna	Zhou	JST Power
Request Membership	Arvind	Kumar	Delta Star Inc
Request Membership	Ashwini	Labh	Hitachi Energy
Guest	Balaji	Janakiraman	Virginia Transformer
Guest	Benjamin	Guinand	Power Magnetics
Guest	Bernard	LaBean Jr	Consumers Energy Company
Member	Bertrand	Poulin	Hitachi Energy
Member	Bill	Griesacker	WGA
Member	Brian	McBride	Cargill, Inc.
Member	Bruce	Webb	Knoxville Utilities Board
Member	Camilo	Casallas	Trench Limited
Guest	Chanmin	Jeong	HD hyundai
Member	Charles	Sweetser	OMICRON electronics Corp USA
Member	Christopher	Slattery	FirstEnergy Corp.
Guest	Christopher	Whitten	Hitachi Energy
Member	Cihangir	Sen	Duke Energy
Request Membership	Cole	Van Dreel	American Transmission Co.
Member	Craig	Colopy	Retired from EATON
Guest	Crystal	Qiao	Trench limited
Guest	Dalho	kim	iljin electric
Member	Daniel	Blaydon	Baltimore Gas and Electric
Member	Daniel	Sauer	EATON Corporation
Guest	Daniel	Obregon	TTEF
Guest	Daniel	Crockett	Ameren

Request Membership	Dappen	Tim	Cargill
Member	David	Calitz	Siemens Energy
Guest	David	Caverly	Trench Limited
Member	David	Larochelle	NDB Technologies
Member	David	Murray	Tennessee Valley Authority
Guest	David	Stankes	3M
Member	David	Wallace	Mississippi State University
Member	David	Wallach	Duke Energy
Guest	Dean	Park	Hyosung Hico
Guest	Derek	Hollrah	Burns & McDonnell
Member	Detlev	Gross	Independent Consultant
Member	Dharam	Vir	Prolec GE Waukesha
Guest	Didier	Hamoir	Transformer Protector Corporation
Secretary	Diego	Robalino	Megger
Member	Dinesh	Sankarakurup	Duke Energy
Request Membership	Dumitru	Diaconu	Delta Star Inc
Member	Dwight	Parkinson	EATON Corporation
Member	Eduardo	Garcia Wild	Siemens Energy
Request Membership	Eduardo	Tolcachir	Tubos Trans Electric S.A.
Member	Egon	Kirchenmayer	Siemens Energy
Guest	Egui	Espitia	Reinhausen Manufacturing Inc
Member	Elise	Arnold	SGB
Member	Enrique	Betancourt	Prolec GE
Member	Eric	Davis	Consultant
Guest	Eric	Elson	San Diego Gas & Electric
Guest	Erik	Tarango	Olsun electric
Member	Evgenii	Ermakov	Hitachi Energy
Member	Ewald	Schweiger	Siemens Energy
Member	Fei	Yang	Hitachi Energy
Request Membership	Fernando	Duarte	Hitachi Energy
Member	Fernando	Leal	Prolec GE
Member	Francis	Mills	POWER Engineers
Request Membership	Gabriel	Mamede	Siemens Energy
Member	Gabriel	Delgado	Invenergy
Guest	Garret	Sarkinen	Xcel Energy
Request Membership	Garrett	Bradshaw	Howard Industries
Guest	Geraldo	Magela Junior	Siemens-Energy
Request Membership	Guang	Yuan	Hitachi Energy
Member	Hakan	Sahin	Virginia Transformer Corp
Request Membership	Hampton	Steele	Tennessee Valley Authority
Member	Harry	Pepe	Phenix Technologies, Inc.
Guest	Hector	Villa	Ecuatran SA
Request Membership	Hongzhi	Zhang	Hitachi Energy
Member	Hugo	Flores	Ermco
Guest	Hyounggon	Ryu	HD Hyundai electric
Member	Ion	Radu	Hitachi Energy
Guest	Isaac	Abdalla	HICO America
Guest	James	Gardner	RESA Power

Member	James	McBride	JMX High Voltage
Member	Janusz	Szczechowski	Maschinenfabrik Reinhausen
Request Membership	Jason	Snyder	FirstEnergy
Member	Jason	Varnell	Doble Engineering Co.
Member	Jason	Beaudoin	Weidmann
Member	Javier	Arteaga	Hitachi Energy
Guest	Jean	Gagnon	
Member	Jean Carlos	Hernandez	NEETRAC Georgia Tech
Guest	Jean-Noel	Berube	Rugged Monitoring Quebec Inc
Member	Jeffrey	Britton	Phenix Technologies, Inc.
Guest	Jeffrey	Wright	Duquesne Light Co.
Guest	Jeremiah	Bradshaw	Bureau of Reclamation
Guest	Jesse	Duffy	Nashville Electric Service
Guest	Jesus	Sanchez Rodriguez	Vertiv
Guest	Jiahao	Xie	S&C electric
Member	Joe	White	POWER Engineers
Guest	John	Bule	DTE Energy
Member	John	John	Virginia Transformer Corp.
Guest	John	Wagner	American electric power
Guest	Jonathan	Reimer	FortisBC
Member	Jonathan	Tan	Northern Transformer
Guest	Jose	Gamboa	H-J Family of Companies
Member	José Luis	Machain	Prolec GE
Request Membership	Joshua	Bohrn	PacifiCorp
Guest	Joshua	Watson	NPPD
Request Membership	Joshua	Yun	Virginia Transformer Corp.
Member	Juan	Castellanos	Prolec GE
Guest	Juan	Ortiz	Reinhausen Manufacturing
Guest	Juan	Rodriguez	Magnetron
Member	Juan Alfredo	Carrizales	Prolec GE
Member	Juliano	Montanha	Siemens Energy
Request Membership	Kabir	Sethi	Hitachi Energy Germany Ag
Guest	Karl	Jakob	Cargill
Member	Kayland	Adams	Prolec-GE Waukesha
Guest	Kevin	Hampton	Siemens Energy
Member	Klaus	Pointner	Trench Austria GmbH
Guest	Komelabbas	Lakhani	Siemens Energy
Member	Kris	Zibert	Allgeier, Martin and Associates
Guest	Kristopher	Neild	Megger
Guest	Kumar	Mani	Duke Energy
Member	Kurt	Kaineder	Trench
Guest	Kyle	Heiden	EATON Corporation
Member	Kyle	Stechschulte	American Electric Power
Guest	KyungChan	An	HYOSUNG
Guest	Landen	Kwan	US NRC
Guest	Laszlo	Kadar	Laszlo & Associates
Guest	Leonard	Torchia	PSE&G
Guest	Logan	Merrill	OMICRON

Guest	Luc	Dorpmanns	Royal SMIT Transformers
Member	Luc	Loiselle	Tetra tech
Guest	Luiz	de Oliveira	Hitachi Energy
Request Membership	Manan	Pandya	Siemens Energy
Guest	Manish	Saraf	Hammond Power Solutions
Request Membership	MARCELINO	PEREZ	PROLEC
Member	Marco	Espindola	Hitachi Energy
Guest	Marcos	Czernoruck	Hitachi Energy
Request Membership	Marcos	Ferreira	FEMA
Member	Markus	Schiessl	SGB
Guest	Mateusz	Kwiatkowski	Hitachi Energy
Member	Matthew	Sze	Omicron Electronics
Member	Matthew	Weisensee	PacifiCorp
Request Membership	Michael	Botti	Hyosung HICO
Guest	Michael	Sharp	Trench Limited
Guest	Michael	Craven	Qualus
Guest	Mick	Kasonga	Oncor
Member	Mickel	Saad	Hitachi Energy
Guest	Miguel	Fernandez	Braintree Electric
Member	Miguel	Garcia	Hitachi Energy
Request Membership	Mihir	Amin	Eaton
Guest	Miljenko	Hrkac	Hitachi Energy
Guest	Monil	Patel	Pacific Gas & Electric
Member	Moonhee	Lee	Hammond Power Solutions
Request Membership	Moses	Manzano	Hyosung HICO
Guest	Mostafa	Agharahimi	Georgia Transmission Corp.
Request Membership	Nader	Masoud	Central Moloney
Guest	Naveen	Bhardwaj	Trench Group
Request Membership	Nicholas	Jensen	Delta Star Inc.
Guest	Nicholas	Post	WEC Energy Group
Request Membership	Nihat	Kosedagi	ERMCO
Guest	Nikolaus	Dillon	Dominion Energy
Guest	Omar	Mendez	Prolec
Member	Onome	Avanoma	MJ Consulting
Request Membership	Orlando	Giraldo	H-J Family of Companies
Member	Parminder	Panesar	Virginia Transformer Corp.
Guest	Patrycja	Jarosz	IEEE SA
Request Membership	Paul	Weyandt	Schneider Electric
Guest	Peter	Heinzig	Weidmann Electrical Technology
Member	Peter	Werelius	Megger
Guest	Peter	Zhao	Hydro One
Member	Philip	Hopkinson	HVOLT Inc.
Chair	Poorvi	Patel	Electric Power Research Institute (EPRI)
Member	Pragnesh	Vyas	Cleveland Cliffs
Guest	Prudhvi Anand	Bhattiprolu	AES
Request Membership	Qasim	Khan	NEETRAC -Georgia Tech
Guest	Rafal	Kowalski	Hitachi Energy

Member	Rakesh	Patel	Hitachi Energy
Member	Ravi	Gupta	Megger
Member	Raymond	Frazier	Ameren
Member	Reto	Fausch	RHF Solutions
Guest	Ricardo	Lopes	Efacec
Guest	Richard	vonGemmingen	Dominion Energy
Member	Rob	Ghosh	GE Vernova
Member	Roberto	Da Silva	Maschinenfabrik Reinhausen
Member	Rodrigo	Ronchi	WEG Transformers México
Member	Roger	Hayes	GE Vernova
Member	Ronald	Hernandez	Doble Engineering Co.
Guest	Rudolf	Ogajanov	Hitachi Energy
Guest	Ryan	Hogg	Bureau of Reclamation
Guest	Ryan	Musgrove	Oklahoma Gas & Electric
Member	Saif	Hossain	Trench Group
Request Membership	Salahuddin	Shaikh	NRG Energy
Guest	Sam	Attaguile	3M Company
Member	Sami	Debass	Electric Power Research Institute (EPRI)
Member	Samragini	Dutta Roy	Siemens Energy
Guest	Sanjay	Patel	Royal Smit Transformers
Member	Sanjib	Som	PTT, LLC
Guest	Saramma	Hoffman	PPL
Member	Scott	Dennis	Hitachi Energy
Member	Scott	Thomas	Hitachi Energy
Guest	Sergiusz	Kapka	Hitachi Energy
Member	Shawn	Gossett	Ameren
Guest	Sheila	Ray	US Nuclear Regulatory Commission
Member	Sheldon	Kennedy	Sheldon P Kennedy Engineering PLLC
Guest	Shibao	Zhang	PCORE
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Stephen	Shull	BBC Electrical Services, Inc.
Member	Steve	Snyder	Hitachi Energy
Guest	Steven	Ashcraft	
Request Membership	Steven	Brzoznowski	Bonneville Power Administration
Guest	Sudip	Chanda	Virginia Transformer Corp.
Guest	Sukin	Jang	ILJIN Electric
Request Membership	Sunny	Swarna	Virginia Transformer Corp
Request Membership	Swapnil	Marathe	Megger
Guest	Sylvain	Lapointe	Rugged Monitoring
Member	Tauhid Haque	Ansari	Hitachi Energy
Member	Terry	Wong	Trench Limited
Request Membership	Thien	Pham	Siemens Energy
Guest	Thomas	Holifield	Howard industries Inc
Member	Thomas	Melle	HIGHVOLT
Guest	Thomas	Propts	Dominion Energy
Member	Tim-Felix	Mai	Siemens Energy
Member	Timothy	Raymond	Inductive Reasoning

Guest	Toni	Mellin	Vaisala
Member	Troy	Tanaka	Burns & McDonnell
Guest	Valentina	Valori	Hitachi Energy
Guest	Vivian	Chan	Hitachi energy
Member	Waldemar	Ziomek	PTI Transformers
Member	Weijun	Li	Braintree Electric Light Dept.
Request Membership	Wilerson	Calil	Hitachi Energy
Member	William	Boettger	Boettger Transformer Consulting LLC
Guest	William	Solano	Voltyx
Member	Xose	Lopez-Fernandez	Universidade de Vigo
Member	Yeounsoo	Kim	JST power equipment
Member	Zan	Kiparizoski	Howard Industries
Request Membership	Zhang	Hongzhi	Hitachi Energy
Member	Zoltan	Roman	GE Vernova

SC Chair requested a motion to adjourn the meeting.

Dan Sauer made a motion, seconded by Evgenii Ermakov.

Meeting Adjourned at 12:15 PM.

Distribution Transformers Subcommittee

Task force / Working Group Report

Annex C Distribution Transformers Subcommittee – Chair: Jerry Murphy

March 26, 2025
Denver, CO USA

Chair: Jerry Murphy
Vice-Chair: Josh Verdell
Secretary: Martin Rave

C.1 General Opening

The Chair opened the meeting welcoming everyone and provided opening remarks. The Chair reminded the Working Group (WG) and Task Force (TF) Chairs to keep information up to date on the Transformers Committee website. The Chair also stated copyright and patent issues must be brought to the attention of the Subcommittee. The Chair provided a summary of the status of Distribution Transformers standards. Josh Verdell reviewed the membership changes. A slide was presented welcoming the new members of the Subcommittee. To establish a quorum, a QR code was displayed for tracking attendance. A quorum was established based on QR code responses. Recorded attendance showed 153 in attendance, including 60 of 93 members. The list of attendees and affiliations is attached below.

The meeting agenda was reviewed. Tom Dauzat made a motion and seconded by Dan Sauer to approve the agenda. The meeting agenda was unanimously approved.

The Fall 2024 meeting minutes were reviewed. Marcos Ferreira made a motion and seconded by Phil Hopkinson to approve the meeting minutes. The meeting minutes were unanimously approved.

The Chair then requested WG and TF reports.

C.2 Working Group and Task Force Reports

██████ C57.12.20 – Overhead Distribution Transformers – Al Traut

This working group did not meet.

██████ C57.12.28, .29, .30, .31 & C57.12.32 – Enclosure Integrity – Dan Mulkey

Martin Rave, in the absence of Jeremy Van Horn (Vice-Chair), presented the following minutes from the working group meeting on March 25, 2025, at 8:00 AM MDT with 76 in attendance.

1. Vice-Chair Jeremy Van Horn called the meeting to order at 8:00 AM MDT, with Luke Grandbois acting as secretary.
2. Opening remarks and announcements
 - a. Attendance was taken using a QR code and Microsoft form.
 - b. Dan Mulkey and Audrey Siebert-Timmer could not attend the meeting.
3. Jeremy Van Horn reviewed IEEE SA Essential Patent Claims, Copyright Policy, & Participant Behavior. No issues were raised.
4. Membership changes were noted:
 - a. **Added: Jared Bates, David Rohrer, Tim Mentor, Fernando Meza**

Distribution Transformers Subcommittee

Task force / Working Group Report

b. Removed: None

5. Quorum was verified. The working group consisted of **68** members, requiring **35** for quorum. **37** members were counted at the start of the meeting. Attendance records later confirmed **40** members attended.
6. Jeremy Van Horn requested approval of the Spring 2025 Agenda. Mike Thibault made a motion, second by Marty Rave. Agenda was unanimously approved.
7. Jeremy Van Horn requested approval of the Fall 2024 Minutes. Marty Rave made a motion, second by Mike Thibault for approval of the minutes. Minutes were unanimously approved.
8. Status of Standards:
 - a. C57.12.28 Standard for Pad-Mounted Equipment – Enclosure Integrity, Approved 2023
 - i. Expires: 12/31/2034
 - ii. Status: Published May 7, 2024
 - b. C57.12.29 Standard for Pad-Mounted Equipment – Enclosure Integrity for Coastal Environments, Approved 2023
 - i. Expires: 12/31/2034
 - ii. Status: Published May 7, 2024
 - c. C57.12.30 Standard for Pole-Mounted Equipment – Enclosure Integrity for Coastal Environments, Approved 2020
 - i. Expires: 12/31/2030
 - ii. Status: Plan to request PAR Dec 2026
 - iii. Target: begin ballot Nov 2029
 - d. C57.12.31 Standard for Pole-Mounted Equipment – Enclosure Integrity, Approved 2020
 - i. Expires: 12/31/2030
 - ii. Status: Plan to request PAR Dec 2026
 - iii. Target: begin ballot Nov 2029
 - e. C57.12.32 Standard for Submersible Equipment – Enclosure Integrity, Approved 2019
 - i. Expires: 12/31/2029
 - ii. Par approved: 12/06/2023
 - iii. Par Expires: 12/31/2027
 - iv. Status: Draft 1.5
 - v. Target: begin ballot Nov 2026
9. Old business:
 - a. *Standards Clean up* – Jeremy Van Horn presented on behalf of Dan Mulkey suggested changes to the document:
 - i. In the Definitions clause, clarify the Note in Design tests to articulate the value of repeating design tests periodically.

Distribution Transformers Subcommittee

Task force / Working Group Report

There was discussion around the use of the terms “Design Test” and “Type Test” and how they are used in C57.12.80. Mike Thibault made a **motion**, seconded by Stephen Shull to accept the changes but with the term “Design tests” changed to “Enclosure Design Tests”. The motion passed with 29 for, 2 opposed, and 3 abstaining.

- ii. Add “Substrate” as a defined term with the following definition “The uncoated material that provides structural integrity to the enclosure.”

Jerry Murphy made a **motion**, seconded by Tom Dauzat, to accept the proposed change as is. The motion passed with unanimous approval.

- iii. In clause 5.6.6,
 - 1. remove “(QUV)” in the title of the clause,
 - 2. add a sentence stating “This test requirement shall apply only for coated surfaces on the exterior of the enclosure”
 - 3. Modify the first sentence to read “Three coated panels, fabricated per Figure 4, shall be tested per ASTM D4587, Cycle 2 (Ultraviolet Accelerated Weathering) for 504 hours utilizing either the FS-40 or UVB-313EL lamps...” in line with the C57.12.28-29 standards.

A **motion** was made by Justin Minikle and seconded by Paul Chisholm to approve the clause as presented. The motion passed unanimously.

- iv. In clause C.1 General, add a footnote to NACE stating “In 2021, SSPC and NACE were merged under the auspices of AMPP (Association for Materials Protection and Performance) standards program and accredited by ANSI on 05-01-2024. Their present policy is that revisions to published SPCC and NACE documents will retain the legacy numbering system.”

A **motion** was made by Tom Dauzat and seconded by Mike Thibault to approve the footnote as presented. The motion passed unanimously.

- b. *Task Force on 4.2.9 Flame Test* – Bruce Webb presented the findings from the task force looking at Clause 4.2.9. The task force recommended adding the following clause:

“Clause 4.2.9 Fire Resistance

The enclosure shall be constructed of fire-resistant material. Non-metallic enclosures shall be made from material having a flammability rating of V-0, 5VA per UL 94 (IEC 60695-11-10-20) testing methods.”

A **motion** was made by Tom Dauzat and seconded by Jerry Murphy to approve the clause as presented. The motion passed unanimously.

- c. *Task Force on Holiday definition* – Justin Minikel presented the following proposed definition to “holiday”:

“Holiday: *A small, pinhole sized void or discontinuity in a coating that exposes the underlying material.*

NOTE-Typically caused by errors in surface preparation or application of coating materials, holidays can create corrosion cells that reduce the life of a protective coatings system.”

A **motion** was made by Paul Chisholm and seconded by Gilbert Kozar to approve the clause as presented. The motion passed unanimously.

Distribution Transformers Subcommittee

Task force / Working Group Report

- d. *Impact Test* – Justin Minikel presented a proposed change to clause 5.5 Test Specimens by modifying the beginning of the clause to read as follows:

“Test specimens shall consist of panels of the same material composition used in production and employ a representative gauge thickness based on the typical production part. Test specimens shall be fabricated in accordance with Figure 3, Figure 4, Figure 5, and Figure 6 as to size and design. Quantity and type...”

A **motion** was made by Robert Reepe and seconded by Nabi Almeida to approve the clause as presented. The motion passed unanimously.

10. New Business

- a. *Fire Resistance Task Force Recommendation* – Bruce Webb presented a proposed new clause 4.2.10 with the following language:

“4.2.10 Non-Metallic Enclosure

Any non-metallic enclosure shall retain an outdoor suitability rating of f1 per UL 746C.”

Tom Dauzat pointed out that for different plastics it is not always easy to find these ratings. A **task force** was formed to investigate further and provide an updated recommendation. The Task Force is chaired by Bruce Webb and consists of the following members:

- Bruce Webb - Chair
- Noah Chesser
- Mike Thibault
- Joel Pacas

- b. *Impact test in clause 5.6.4* – Jake Draxton led a discussion on the size of the indenter in C57.12.32 relative to the other Enclosure Integrity standards.

A **task force** was formed to investigate. The Task Force is chaired by Jake Draxton and consists of the following members:

- Jake Draxton – Chair
- Justin Minikle
- Vinay Patel

- c. *Insulating Liquid Resistance, in clause 5.6.5* – Jake Draxton led a discussion on the language of “using either method”.

There was discussion around the scratch method and the gouge method and how the gouge method is generally more telling. It was decided that Jake Draxton’s Task Force would increase its scope to include a proposal to modify the language from “using either method” to “using the gouge hardness method”.

- d. *Abrasion Resistance in Clause 5.6.8* – Jake Draxton led a discussion on the interpretation of “1000 g weight” with two-arm test rig.

It was decided that Jake Draxton’s Task Force would increase its scope to include a recommendation for wording to make it explicitly clear within the standard that the 1000 g weight is per arm.

- e. *Polls for document changes* – Jeremy Van Horn led a discussion on the group’s appetite to address comments that had previously been brought up, including revisiting the UV test method/requirements, adding a better color standardization, and consolidating some of the standards.

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A **task force** was formed to investigate adding a better color standardization. The Task Force is chaired by Jeremy Van Horne and consists of the following members:

- Ken Rieke
- Alejandro Macias
- Jake Draxton
- Brian Karplonski
- Mike Zarnowski
- Patrick Kozar
- Justin Mininkle
- Dan Mulkey
- Jeremy Van Horne - Chair

11. Next meeting: October 21, 2025, in Bonita Springs, Florida, USA.

a. The following attendees requested membership and will be added to membership for the Fall 2025 meeting:

- i. Fernando Duarte (EPRI)
- ii. Fernando Tirado (Prolec)
- iii. Gilberto Garza (Prolec GE)
- iv. Huan Dinh (Hitachi Energy)
- v. Hugo Murillo (The H-J Family)
- vi. Jake Draxton (Sherwin-Williams)
- vii. Jim Cai (JSHP Transformers)
- viii. Martin Munoz (Orto de Mexico)
- ix. Miguel Garcia (Hitachi Energy)
- x. Nicholas Manske (Oncor Electric Delivery)
- xi. Pragnesh Vyas (Cleveland Cliffs)

12. The meeting was adjourned at 9:15 AM CST.

Submitted by: Luke Grandbois

Date: March 25, 2025

List of Members:

<i>Alex Ayala (Power Partners)</i>
<i>Martin Bachand (Cloverdale Paint Inc.)</i>
<i>Jeffrey Brooks (POWER Engineers)</i>
<i>Darren Brown (Howard Industries)</i>

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Noah Chesser (Oncor Electric Delivery)
John Chisholm (IFD Technologies)
Douglas Craig (Richards Manufacturing Co.)
Thomas Dauzat (AEP)
Craig Derouen (ERMCO)
James Gardner (Prolec GE)
Carlos Gaytan (Prolec GE)
Ali Ghafourian (H-J Enterprises, Inc.)
Ramadan Issack (American Electric Power)
Gary King (Howard Industries)
Gilbert Kozar (Northeast Transformer Services, LLC)
Patrick Kozar (Northeast Transformer Services, LLC)
Andrew Larison (Hitachi Energy)
Tiffany Lucas (Prolec GE)
Alejandro Macias (CenterPoint Energy)
Justin Minikel (EATON Corporation)
Michael Morgan (Duke Energy)
Daniel Mulkey (Mulkey Engineering Inc.)
Jerry Murphy (Chen Moore & Associates)
Dwight Parkinson (EATON Corporation)
Vinay Patel (Consolidated Edison Co. of NY)
Miguel Plascencia (Pacific Gas & Electric)
Ion Radu (Hitachi Energy)
James Ratty (Electronic Technology Inc.)
Martin Rave (IFD Technologies)
Robert Reepe (Georgia Power Co.)
Mason Rush (Central Moloney Inc)
Pedro Salgado (Electronic Technology Inc.)
Stephen Shull (BBC Electrical Services, Inc.)
Igor Simonov (Toronto Hydro)
Edward Smith (H-J Family of Companies)
James Spaulding (Fort Collins Utilities)
Michael Thibault (Pacific Gas & Electric)
Alan Traut (Howard Industries)
Reinaldo Valentin (Duke Energy)
Jeremy Van Horn (IFD Technologies)
Joshua Verdell (ERMCO)
Shelby Walters (Howard Industries)
Alan Wilks (Consultant)
Michael Zarnowski (Carte International)

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List of Guests:

<i>Jared Bates (Oncor Electric Delivery)</i>
<i>Matthew Chisholm (IFD Technologies)</i>
<i>Janet Crockett (Fayetteville PWC)</i>
<i>John Crotty (Ameren)</i>
<i>Rohrer David (First Energy)</i>
<i>Huan Dinh (Hitachi Energy)</i>
<i>Jake Draxton (Sherwin-Williams)</i>
<i>Sanford Fong (Georgia Power Co.)</i>
<i>Kevin Frye (Central Moloney Inc.)</i>
<i>Luke Grandbois (IFD Technologies)</i>
<i>Garza Hector (Orto de Mexico)</i>
<i>Jason Lambert (JST Power)</i>
<i>Nicholas Manske (Oncor Electric Delivery)</i>
<i>Timothy Menter (Lincoln Electric System)</i>
<i>Fernando Meza (Power Partners)</i>
<i>Charles Morgan (Eversource Energy)</i>
<i>Martin Munoz (Orto de Mexico)</i>
<i>Stefan Schindler (Maschinenfabrik Reinhausen)</i>
<i>Fernando Tirado (Prolec)</i>
<i>Bruce Webb (Knoxville Utilities Board)</i>
<i>Kangjin Lee (Cheryong Electric)</i>
<i>Rebecca Kim (Cheryong Electric)</i>
<i>Jim Cai (JSHP Transformers)</i>
<i>Nicholas Post (WEC Energy Group)</i>
<i>Joel Pacas (IFD Technologies)</i>
<i>Brian Conneighton (Cleveland-Cliffs)</i>
<i>Bryan Marquardt (Cleveland-Cliffs)</i>
<i>Fernando Duarte (EPRI)</i>
<i>Pragnesh Vyas (Sunbelt Solomon)</i>
<i>Juan Velasquez (Magnetron SAS)</i>
<i>Hugo Murillo (The H-J Family)</i>
<i>Joel Schumack (Ameren)</i>
<i>Gilberto Garza (Prolec GE)</i>
<i>Miguel Garcia (Hitachi Energy)</i>
<i>Qasim Khan (NEETRAC - Georgia Tech)</i>
<i>Vedrana Starcevic Prebeg (Koncar-DFST)</i>
<i>David Cordova (Maddox Industrial XFMR)</i>
<i>Robert Mennonna (Maddox Industrial XFMR)</i>
<i>Holly Wassall (JST Power)</i>
<i>Megan Bereswill (JST Power)</i>

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

Steve Shull presented the following minutes from the working group meeting on March 24, 2025, at 3:15 PM MDT with 93 in attendance.

The Chair called the meeting to order at 3:15 P.M. MDT on March 24, 2025. Attendees verbally identified themselves by name and affiliation.

1. IEEE Privacy Policy
The Chair verbally stated and explained in detail all the information according to IEEE Privacy Policy.
2. New Members
The Chair announced and recognized the newest members to the Working Group. The Chair also explained the process of becoming a member and retaining membership status.
3. Meeting Quorum
The Chair displayed the members of the WG and a quorum was established.
4. Agenda Approval
The Chair displayed the agenda for this meeting. A motion was made by Tom Dauzat and seconded by Jerry Murphy to “Approve the Agenda as shown”. The Chair asked for any opposition to the displayed Agenda to which no opposition was observed. The Agenda was approved as shown.
5. Minutes Adjustment
Prior to approval of the minutes for the previous WG session in St. Louis MO, the Chair advised there was some confusion as to the intent of the motion for approving the changes proposed by Task Force 4 regarding article 7.2 and the value of the induced test voltage. The WG Chair explained, as affirmed by the Task Force Chair, that while the WG had approved to move forward with a revision to the induced voltage rating to 2X rated voltage in lieu of 3.46X rated + 1000V, the WG had also decided to delay any wording changes until the task force had an opportunity to review the rest of the document to ensure nothing had been missed or duplicated. Considering this, the WG Chair recommended revision of the previous session’s minutes by striking the last sentence of the Fall 2024 minutes as shown in the attached revised minutes.

A motion to approve the amended minutes was made by Carlos Gaytan and seconded by Martin Rave. The Chair asked for any discussion and there was none. There was no opposition to the proposed modification.
6. Minutes Approval
Upon approval of the motion to amend the previous minutes, a motion was made by Carlos Gaytan and seconded by Martin Rave to “approve the Last Meeting Minutes as modified”. The Chair asked if there was any opposition to approving the amended minutes to which no opposition was observed. These amended Minutes were approved.
7. Confirmation of IEEE SA Essential Patent Statement
The patent information request was displayed. The chair provided an opportunity for participants to identify patent claim(s)/patent application claim(s) and/or if a participant is personally aware of patent claim(s)/patent application claim(s) that may be essential for the use of this standard. There were no responses to this request so no patent claim(s)/patent application claim(s) were identified.
8. IEEE SA Copyright Policy Statement and Participant Behavior Policy were shown without any discussion or objection.

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9. Old Business

a. Three Phase Transformer Standards Comparison – Test Sections

Alan Traut reviewed the information of the past and present three phase standards as they pertain to the required induced voltage testing level. Alan Traut shared the following observations:

- C57.12.26-1992: Specified that “Transformer primary is designed for solidly-grounded application”
- C57.12.34-2004: Eliminated text clarifying that the voltage was a line to ground voltage. Deleted the sentences “which will develop from the high voltage line terminal to ground” from the 1992 version, and “In no case, however, shall the line-to-ground voltage developed exceed...”
- C57.12.34-2009: Replaced “high-voltage winding”, with “winding with a voltage greater than 600 V”. Added text of exemption of chopped wave test
- C57.12.34-2015: No major changes other than update references to other Stds.
- C57.12.34-2022: No major changes other than update references to other Stds.

He pointed out that only the C57.12.34 standard required the 3.46X rated +1000V voltage level for induced voltage testing, whereas all other three phase standards relied on a 2X rated voltage level.

b. C57.12.34 Induced Voltage Testing discussion

Michael Zarnowski, TF#4 Chair, revisiting the induced voltage test level of 3.46X rated + 1000V and how such a level exceeds phase-to-phase internal clearances, coil-to-coil insulation and switch ratings. He noted that the WG discussed the current wording of clauses 7.1, 7.2 and 7.3. They recommended that 7.2 be rewritten. They recommended that 7.3 be retained because this was done with the understanding that standard C57.12.34 is intended for transformers designed for distribution and not power.

Carlos Gaytan presented an alternative proposal to clause 7.2 based on the observation that the TF#4 proposed revision of changing the induced voltage test level to 2X rated would not be applicable to units where the neutral was internally grounded, and that in such cases, a special induced voltage test level would be required that induces a line-to-ground voltage in the HV winding close to the specified value of the applied voltage test. The alternative proposal presented by Carlos was discussed at length, covering the use of either three-phase or single-phase sources to apply the test voltage, applicability of test voltage levels to graded insulation in the case of grounded WYE-WYE transformers, and the feasibility of always being able to remove the neutral ground connection. His presentation is included in the appendix of these minutes

After continued discussion, a motion to approve the TF#4 proposed wording for clause 7.2. was made by Michael Zarnowski and seconded by Jerry Murphy.

- *7.2 Dielectric tests*

For wye-wye connected transformers with a high voltage winding neutral terminal with interconnected or internally grounded neutrals, no applied voltage test is required on a winding greater than 600 V.

When high- or low-voltage terminations are used that fall under IEEE Std 386, they may not be suitable for chopped wave testing; therefore, when terminations that

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*conform to IEEE Std 386 are used (bushing wells, 600 A integral bushings, etc.)
chopped wave tests are not required.*

The Chair asked for any discussion on the proposed change and, upon no further discussion, initiated a vote to approve the motion. The motion carried with the following results:

- Those in favor: 28
- Those opposed: 2
- Abstentions: 5

10. New Business

TF4 pointed out a discrepancy between the wording of clause 8.7.4.1 titled “Neutral Terminal – 600V and Below” and Figures 2 and 6 which have an option for an H0. The Chair displayed the proposed wording by TF#4 to address the discrepancy.

8.7.4.1 Neutral terminal—600 V and below

*The neutral terminal shall be either a blade connected directly to the tank or a fully insulated terminal. If a fully insulated terminal is used, a ground pad shall be provided on the outer surface of the tank. One or more removable ground straps suitably sized for the short-circuit rating of the transformer as defined in IEEE Std C57.12.00-2021 shall be provided and connected between the neutral terminal and the ground pad. For wye-wye connected units ~~where, the high-voltage and low voltage neutral are shall be connected to the low-voltage neutral~~ **together internally, there shall be** with provisions for opening this connection for testing.*

A motion to approve the TF4 proposed wording for clause 7.2. was made by Michael Zarnowski and seconded by Gary King. The Chair asked for any discussion on the proposed change and upon no further discussion, initiated a vote to approve the motion. The motion carried with the following results:

- Those in favor: 27
- Those opposed: 1
- Abstentions: 8

11. After concluding new business, the Chair advised the new draft of the standard will be published for careful review by members, with a vote to go to Ballot in the upcoming Fall meeting.

12. The meeting adjourned at 4:30 P.M. MDT.

Submitted by: Nader Masoud

Date: 3/24/2025

Attendance:

A sign-up sheet was circulated with total of 93 in attendance including 40 Members and 53 Guests of which 8 requested Membership.

First Name	Last Name	Company	Role
Alejandro	Ayala	Power Partners	Member
Jared	Bates	Oncor Electric Delivery	Member
Thomas	Callsen	Weldy-Lamont Associates	Member
Noah	Chesser	Oncor Electric Delivery	Member

First Name	Last Name	Company	Role
James	Spaulding	Fort Collins Utilities	Member
Michael	Thibault	Pacific Gas & Electric	Member
Jeremy	Van Horn	IFD Technologies Inc.	Member
John	Vartanian	National Grid	Member

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Thomas	Dauzat	AEP-SWEPCO	Member
Carlos	Gaytan	Prolec GE	Member
Kenneth	Hampton	Baltimore Gas & Electric	Member
Gary	King	Consultant	Member
Gilbert	Kozer	Northeast Transformer Services, LLC	Member
Patrick	Kozer	Northeast Transformer Services, LLC	Member
Alejandro	Macias	Centerpoint Energy	Member
Nicholas	Manske	Oncor Electric Delivery	Member
Lee	Mathews	Howard Industries	Member
Michael	Morgan	Duke Energy	Member
Ion	Radu	Hitachi Energy	Member
Martin	Rave	IFD Technologies	Member
Robert	Reepe	Georgia Power Co.	Member
Mason	Rush	Central Moloney	Member
Jaber	Shalabi	VanTran Industries, Inc.	Member
Michael	Shannon	Rea Magnet Wire	Member

Pragnesh	Vyas	Cleveland Cliffs	Member
Zachary	Weiss	WEG Transformers USA Inc.	Member
Michael	Zarnowski	Carte International	Member
Rehan	Ali	Siemens Energy	Member
Jeffrey	Brooks	Asplundh Engineering Services	Member
Jose	Gamboa	H-J Family of Companies	Member
Giovanni	Hernandez	Virginia Transformer Corp.	Member
Ramadan	Issack	American Electric Power	Member
Brian	Klaponski	Carte International	Member
Weijun	Li	Braintree Electric Light Dept.	Member
Parry	Lively	Tempel	Member
Jerry	Murphy	Chen Moore and Associates	Member
Dwight	Parkinson	EATON Corporation	Member
Reinaldo	Valentin	Duke Energy	Member
Bruce	Webb	Knoxville Utilities Board	Member
Joshua	Yun	Virginia Transformer Corp.	Member

First Name	Last Name	Company	Role
Jerry	Allen	Metglas, Inc.	Guest
Kevin	Biggie	Weidmann Electrical Technology	Guest
Brian	Connelghton	Cleveland-Cliffs	Guest
Janet	Crockett	Fayetteville PWC	Guest
Hector	Garza	Orto de Mexico	Guest
Luke	Grandbois	IFD Technologies	Guest
Kendrick	Hamilton	ERMCO	Guest
Thomas	Holifield	Howard Industries	Guest
Patrycja	Jarosz	IEEE SA	Guest
Braxton	Jones	SD Meyers	Guest
Adam	Klaponski	Carte International Inc.	Guest
Fredy	Murcia	Siemens Energy	Guest
Stephen	Oakes	WEG Transformers USA Inc	Guest
Joel	Pacas	IFD Technologies	Guest
Stefano	Schindler	Reinhausen	Guest
Alan	Traut	Howard Industries	Guest
Joshua	Verdell	ERMCO	Guest
Allen	Hsiao	Shihlin Electric	Guest
Rebecca	Kim	Cheryong Electric	Guest
Kang-Jtw	Lee	Cheryong Electric	Guest
Antonio	Robles	Bureau of Reclamation	Guest

First Name	Last Name	Company	Role
Stephen	Walbach	Alabama Power	Guest
Nicholas	Koinis	Centerpoint Energy	Guest
Nihat	Kosedagi	ERMCO	Guest
Nabi	Almeida	Prolec GE	Guest
John	Crotty	Ameren	Guest
Fernando	Duarte	Hitachi	Guest
Kyle	Heiden	EATON Corporation	Guest
Justin	Minikel	EATON Corporation	Guest
Hugo	Murillo	H-J Family of Companies	Guest
Nicholas	Post	WEC Energy Group	Guest
Jospeh	Schumack	Ameren	Guest
Mohammed	Sohail	Trench Limited	Guest
Tim	Tillery	Howard Industries	Guest
David	Walker	MGM Transformer Co.	Guest
Shelby	Walters	Howard Industries	Guest
Alan	Fujimori	Romagnole	Guest
Juan	Rodriguez	Magnetron	Guest
Yeounsoo	Kim	JST Power Equipment	Guest
Fernando	Tirado	Prolec GE	Guest
Jiahao	Xie	S&C Electric	Guest
Ben	Hershberger	Midwest Transformer	Guest

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Luya	Peuc	Koncar Dist.	Guest	Rich	Cryer	Digitalgrid inc.	Guest
Mathew	Greenhaw	OG&E	Guest	Curtis	Moore	Digitalgrid inc.	Guest
Stanley	Yeh	Shihlin Electric	Guest	Chris	Brown	SDGE	Guest
Gilberto	Garza	Prolec GE	Guest	Fidel	Castro	SDGE	Guest
Scott	Beck	Trantech Radiator Products	Guest	Prudhvi	Bhattiprolu	AES	Guest
Hector	Villa	Ecuatran SA	Guest				

The following are the WG amended C57.12.34 Fall 2024 meeting minutes.

The Chair called the meeting to order at 3:15 P.M. CDT on October 28, 2024. Attendees verbally identified themselves by name and affiliation.

13. IEEE Privacy Policy

The Chair verbally stated and explained in detail all the information according to IEEE Privacy Policy.

14. Meeting Quorum

The Chair displayed the members of the WG and a quorum was established.

15. Agenda Approval

The Chair displayed the agenda for this meeting. A motion was made by Tom Dauzat and seconded by Lee Matthews to “Approve the Agenda as displayed”. The Chair asked any opposition to the displayed Agenda to which no opposition was observed. The Agenda was approved as displayed.

16. Minutes Approval

The Chair stated the Last Meeting Minutes were available online. A motion was made by Jerry Murphy and seconded by Mike Thibault to “approve the Last Meeting Minutes as shown online”. The Chair asked any opposition to approved these minutes as posted to which no opposition was observed. The Last Meeting Minutes were approved.

17. Confirmation of IEEE SA Essential Patent Statement

The patent information request was displayed. The chair provided an opportunity for participants to identify patent claim(s)/patent application claim(s) and/or if a participant is personally aware of patent claim(s)/patent application claim(s) that may be essential for the use of this standard. There were no responses to this request so no patent claim(s)/patent application claim(s) were identified.

18. IEEE SA Copyright Policy Statement and Participant Behavior Policy were shown without any discussion or objection.

19. Old Business

Task Force Reports

- TF #2 – The Task Force reported that “Although we are seeing higher kVA units for the voltages listed in Table 3, these requests are tied specifically to projects customized to the site, including the special short circuit current designs to accommodate these requirements.

As such, the TF did not feel it would be appropriate for an IEEE standard to increase the kVA ratings in Table 3.

However, the TF did recommend that the addition of voltages of 416Y/240 and 690Y/398.”

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A motion was made by Igor Simonov and seconded by Gary King to accept these changes. The Chair asked if there was any opposition to approved this motion as presented to which no opposition was observed.

- TF #5 – Update bushing drawings to reference C57.19.02 and make them consistence with a common labeling practice, i.e. X_3 and not $X3$. Since this was editorial, no motion or vote was taken.

This taskforce also made modification to the standard to incorporate the reference to C57.19.02. This resulted in the removal of Figure 19 and 20 since these are reflected in C57.19.02. The tables in these figures were moved to Article 8.7.3 *600 V and below terminals*. This also resulted in modification of this section which is reflected in the current draft.

- TF #4 Test Review – A presentation was made by Michael Zarnowski and Andrew Larison related to Article 7.2 *Dielectric Tests*. The issue that was seen was using an induced test voltage of 3.46X rated + 1000 which at the 125 kV BIL and 150 kV BIL Voltage Test Limits exceeded induced test limits exceed voltage ratings for certain accessories such as dual voltage switches and underoil load break switches and exceeds the interphase insulation levels and under oil lead spacing. This had resulted in advertent failures. The recommendation of the task force was to change the value to 2X rated voltage. After considerable discussion, a motion was made by Gary King to use the 2X rated induced test voltage. The motion was seconded by Rhett Chrysler and the motion passed. ~~The article will be changed to:~~

Dielectric test levels shall be in accordance with the distribution transformer test levels in IEEE Std C57.12.00.¹

Having run out of meeting time, the meeting adjourned at 4:30 P.M. CDT.

¹ Removed by Vote. See Spring 2025 meeting minutes.

Submitted by: Alan Wilks

Date: 10/28/2024

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

This working group did not meet.

██████ C57.12.36 – Distribution Substation Transformers – Jerry Murphy

This working group did not meet.

██████ C57.12.37 – Electronic Reporting of Dist Tr Test Data – Alan Traut

Alan Traut presented the following minutes from the working group meeting March 25, 2025, at 1:45 PM MDT with 44 in attendance.

1. Chair called the meeting to order at 1:45 pm MDT. Members introduced themselves with their affiliation. Paper rosters were circulated to record attendance.

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2. Chair called for identification of essential patents pertaining to the work of this WG. None brought forward. Copyright policy presented. No issues identified.
3. Chair Report
 - a. PAR for revision of C57.12.37 approved on 2/15/2024 with an expiration date of 12/31/2028.
 - b. The current published document C57.12.37-2015 expires 12/31/2025.
4. Total attendance was 44. 25 of 49 members were present and a quorum was declared. Of the 19 guests in attendance, 6 were returning guests and 13 were new guests not on the previous roster. A total of 4 guests requested membership. (2 returning and 2 new guests)
5. Motion to approve the meeting agenda (Steve Shull / Jerry Murphy). Meeting agenda was unanimously approved.
6. Motion to approve the meeting minutes from Fall 2024 St. Louis meeting (Jerry Murphy / Alejandro Macias). Meeting minutes were unanimously approved.
7. The Chair presented edits to the Draft by Dan Mulkey and Ed teNyenhuus after the Fall 2024 meeting. Their edits consisted of punctuation and grammar changes. The resulting document was referred to as Draft 3. The floor was then opened for comments on Draft 3.
8. Josh Verdell made a motion to add X/R ratio (“*with whatever number of spaces needed*”), taking space from the reserve space. The motion was seconded by Alejandro Macias. The motion passed with the following votes being cast:
 - 7 in favor
 - 5 opposed
 - 10 abstentions

After a lengthy discussion, it was then decided that a format of F5.2 was needed to accurately report on the X/R ratio of distribution transformers due to their wide range of sizes.

9. The Chair will make the following modifications to the document and call it “Draft 4”
 - a. Insert new paragraph **4.3.1.2 X/R ratio with a format of F5.2.**
 - b. Fix lower case references to the “**doe**”
 - c. **Change the term “fluid” to “liquid”** in 4.2.23 and Table 2
10. A motion was made to take Draft 4 to ballot (Jerry Murphy / Josh Verdell). The vote was 17 For, 0 Opposed, and 8 Abstentions. Membership present was 25.
11. A motion was made to create a **Comment Resolution Group** with the authority to make editorial and minor technical changes. (Jerry Murphy / Steve Shull) It was unanimously approved. The Comment Resolution Group will consist of the following volunteers:
 - Al Traut
 - Bruce Webb
 - Jerry Murphy

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- Steve Shull
- Josh Verdell
- Carlos Gaytan

12. Next meeting – Bonita Springs, FL October 19-23, 2025

13. Meeting adjourned at 3:05pm CDT.

Submitted: Thomas Callsen, Secretary

Date: 03/31/2025

Attendance:

First Name	Last Name	Company or Affiliation	Role	First Name	Last Name	Company or Affiliation	Role
Alex	Ayala	Power Partners	Member	Jerry	Murphy	Chen Moore & Associates	Member
Gills	Bargome	Fiso	new	Daniel	Obregon (?)	TTE Transformers	new
Jared	Bates	Oncor Electric Delivery	Member	Joel	Pacas	IFD Corporation	Guest
Darren	Brown	Howard Industries	Member	Dwight	Parkinson	Eaton	Member
Chris	Brown	San Diego Gas & Electric	new	Nicholas	Post	WEC Energy Group	Guest ®
Thomas	Callsen	Weldy-Lamont Associates	Secretary	Ion	Radu	Hitachi Energy	Member
Noah	Chesser	Oncor Electric Delivery	Member	Martin	Rave	IFD Technologies	Guest
Brian	Connishton	Cleveland-Cliffs	new ®	Robert	Reepe	Georgia Power Co.	Member
Janet	Crockett	Fayetteville PWC	Member	Mason	Rush	Central Moloney Inc	Member
Thomas	Dauzat	AEP - SWEPCO	new ®	Joe	Schumack	Ameren	Member
Gilberto	Garza	Prolec GE	new	Stephen	Shull	BBC Electrical Services, Inc.	Member
Carlos	Gaytan	Prolec GE	Member	Michael	Thibault	Pacific Gas & Electric	Vice-Chair
Luke	Grandbois	IFD Technologies	new	Fernando	Tirado	Prolec GE	Guest ®
Kenneth	Hampton	Baltimore Gas & Electric	Member	Alan	Traut	Howard Industries	Chair
Jen Carlos	Hernandez-Majia	Georgia Tech -- NEETRAC	new	Joshua	Verdell	ERMCO	Member
Ramadan	Issack	American Electric Power	Member	Shelby	Walters	Howard Industries	Member
Patrycja	Jarosz	IEEE SA	new	Bruce	Webb	Knoxville Utilities Board	Member
Gary	King	Consultant	Guest	Paul	Weyandt	Schneider Electric	Member
Nicholas	Koimis	Centerpoint Energy	new	Stephen	Wolbach	Alabama Power	new
Alejandro	Macias	Centerpoint Energy	Member	Jiahao	Xie	S&C Electric	new
Tim-Felix	Mai	Siemens Energy	new				
Nicholas	Manske	Oncor Electric Delivery	Member		Guest ®	Guest requesting membership	
Nader	Masoud	Central Moloney Inc	Member		new	First time guest, not on previous roster	
Lee	Matthews	Howard Industries	Guest		new ®	First time guest requesting membership	

■ C57.12.38 – Single-Phase Pad-Mounted Transformers – Ali Ghafourian

This working group did not meet.

■ C57.12.39 – Tank Pressure Coordination – Carlos Gaytan

Carlos Gaytan presented the following minutes from the working group meeting March 25, 2025, at 4:45 PM MDT with 50 in attendance.

1. Carlos Gaytan called the meeting to order at 4:45 PM MST. Group introductions were made.
2. Carlos Gaytan reviewed IEEE SA Copyright Policy and Essential Patent Claims. No issues were raised.
3. Quorum was verified. The working group consisted of 41 members, requiring 21 for quorum. Attendance records confirmed 21 members were present for the meeting.

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4. Carlos Gaytan requested approval of the Spring 2025 Agenda. Jerry Muphy made a motion, second by Steve Shull. The agenda was unanimously approved.

5. Carlos Gaytan requested approval of the Fall 2024 Minutes. Marty Rave made a motion, second by Al Traut for approval of the minutes. Minutes were unanimously approved.

6. Old Business

a. Task force report: Liquid Preservation – Luke Grandbois

Luke Grandbois presented the recommendations of the task force for Clause 4.1 Liquid Preservation. The group discussed the recommendation and agreed to add a comma for clarity. The clause, as modified and agreed by the working group is the following:

“By manipulating the tank size, liquid volume, and gas space, the sealed-tank system shall be designed so the internal gas pressure does not exceed 49 kPa (gauge) (7 psig), or -35 kPa (gauge) (-5 psig) while operating within the conditions described in the preceding paragraph without relying upon pressure regulating devices.”

A motion was made by Jerry Murphy and seconded by Marty Rave to accept the clause as proposed and modified by the group. The motion passed unanimously

b. Task force report: Compromising deformation – Luke Grandbois

Luke Grandbois presented the second recommendation of the task force, which is the following updated definition for the term “compromising deformation”:

“compromising deformation: elastic or plastic deformation that precludes normal operation of transformer sealing and cabinet security; compromises mechanical operation of covers or doors, electrical clearances, thermal operation, or the tank’s ability to shed water; or creates areas where corrosive elements can accumulate.”

A motion was made by Steve Shull and seconded by Josh Verdell to accept the definition as proposed. The motion passed unanimously.

c. Task force report: Assess potential conflict with C57.12.00 – Luke Grandbois

Luke Grandbois presented the third finding of the task force, which was to determine whether Clause 4.1.2.2 of C57.12.00 presented a conflict with clause 4.1 of C57.12.39 as it relates to the temperature requirement.

The task force found that no conflict was present between the clauses and recommended that no change to the clause be made.

The working group discussed the proposal and commented that the clause could be interpreted that the transformer doesn’t need to be sealed from -5 to -20 C. Further discussion revealed that -5 C was an acceptable lower temperature limit for a transformer operating at full load.

The working group agreed with the task force’s recommendation. No motion was required as no change was made

d. Review of Draft 1.1 – Carlos Gaytan

Carlos reviewed the changes the working group had previously agreed to in the Draft 1.1 document.

It was discussed that the change to the purpose was acceptable since it had not been included in the PAR.

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Luke Grandbois commented that the purpose is different than the 2017 published version. Carlos mentioned that the draft was based on the latest draft produced by the working group in the previous revision, rather than the version that had been published, since an updated editable template of the 2017 publication had not been provided to the working group by IEEE at this time. It has been requested.

Carlos requested that members of the working group review the draft document prior to the Fall meeting, with the objective of possibly going to ballot in the Fall 2025 meeting.

7. New business

- a. No new business was raised by the working group.

8. Next meeting: October 21, 2025 in Bonita Springs, FL, USA

- a. The following guests requested membership and met the criteria; they will be added to the membership list following the meeting: John Crotty, Tom Dauzat, Gilberto Garza, Rebecca Kim, Joseph Shumack, Shelby Walters

9. The meeting was adjourned at 4:25 PM MDT.

Submitted by: Jeremy Van Horn

Date: March 25, 2025

List of Members

Nabi Almeida (Prolec GE)

Alejandro Ayala (Power Partners)

Samuel Brodeur (Hitachi Energy)

Darren Brown (Howard Industries)

Jim Cai (JSHP Transformers)

Paul Chisholm (IFD Technologies)

Janet Crockett (Fayetteville PWC)

Carlos Gaytan (Prolec GE)

Luke Grandbois (IFD Technologies Inc.)

Didier Hamoir (Transformer Protector Corp)

Ramadan Issack (AEP)

Andrew Larison (Hitachi Energy)

Alejandro Macias (Centerpoint Energy)

Jerry Murphy (CMA)

Dwight Parkinson (Eaton Corp.)

Marty Rave (IFD Technologies Inc.)

Stephen Shull (BBC Electrical Services)

Fernando Tirado (Prolec GE)

Alan Traut (Howard Industries)

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Jeremy Van Horn (IFD Technologies Inc.)

Joshua Verdell (ERMCO)

List of Guests

Rehan Ali (Siemens Energy, inc.)

Brian Conneighton (Cleveland-Cliffs)

John Crotty (Ameren)

Tom Dauzat (AEP)

Fernando Duarte (Hitachi Energy)

Hugo Flores (Ermco)

Gilberto Garza (Prolec GE)

Ken Hampton (BGE)

Rebecca Kim (Cheryong Electric)

Yeounsoo Kim (JST power equipment)

Kang Jin Lee (Cheryong Electric)

Justin Minikel (Eaton)

Martin Muñoz (Orto)

Hossein Nabi-bidhendi (ITEC)

Juan Ortiz (Reinhausen Manufacturing)

Joel Pacas (IFD Technologies)

Ashwin Padmanaban Iyer (STP)

Juan Rodriguez (Magnetron)

Joe Schumack (Ameren)

Stefan Schindler (Maschinenfabrik

Reinhausen)

Ahmad Skeik (Crosslink Technology)

Mike Thibault (pacific gas and electric)

Timothy Tillery (Howard Industries)

Juan Velasquez (Magnetron sas)

Hector Villa (Ecuatran SA)

Pragnesh Vyas (Cleveland Cliffs)

Shelby Walters (Howard Industries)

Joshua Watson (NPPD)

Michael Zarnowski (Carte)

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C57.15 – Step-Voltage Regulators – Dan Sauer

Dan Sauer presented the following minutes from the working group meeting March 24, 2025, at 4:45 PM MDT with 37 in attendance.

1. Opening of meeting and introductions
 - a) If you did not receive the emailed agenda, please update your email address with the WG officers

Dan Sauer started the meeting at 16:46 with introductions from the officers and audience.
2. Record attendance

We requested a quorum check, and we had 18 members present against a list of 27 members. Quorum achieved.
3. Approval of agenda

Motion by Miguel Plascencia seconded by Steve Shull. Unanimously approved.
4. Approval of the February Virtual Meeting Minutes

Motion by Kyle Heiden, seconded by Miguel Plascencia. Unanimously approved.
5. WG documentation review – patents & copyrights

The chair called the WG to attention about any essential patents and/or copyrights that could be a risk to our work, there was no objections or comments.
6. Review of approved IEEE PAR

The chair explained where we stand on the PAR and mentioned that we are now compliant with the requirement by IEC. We are on track to go to ballot with at least 7 months of reserve time.
7. Review of IEC Maintenance Team Status
 - a) We have the required five countries
8. Document Review
 - a) Known Issues
 - i) Universal Interface Issues
 - a) Connection point TF – Kyle Heiden
 - b) Touch Safe – Pin orientation
 - c) Connection point
 - d) Connection method

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Kyle presented two SAE documents with the connector specification. The main difference is the front versus rear release. AS34541B and AS 34041B are the referenced documents. Stephen Shull commented that these are referred from an existing connector. His main concern is regarding the depth of the thread. Kyle mentioned that this is using a shell size 22, which has a dimension M quoted at ~0.97 inches. The main issue is that at this point there are no suppliers of this connector. Kyle shared an excerpt of an email with a supplier where they recommend ordering an AEC3102 box mount with Jam nut or AEC3100 wall mount receptacle with jam nut, and that should be sufficient. The main reference should be AS34541B, Steve Shull recommended that we include this in the standard document as a reference to guide the user/supplier on what they need to order. Miguel Plascencia mentioned that his company has issue with cross threading the jam nut due to the very fine threads. There were comments about specifying stainless steel instead to get a higher mechanical strength. Stephen Shull mentioned that there is a lot of difficulties on ordering the right part. Lee Matthews made a mention that currently this is not an enforced requirement, so there might be an issue on sourcing this component. The task force will continue with their work and will come back to the next meeting with more information.

9. Old business

a) Ratio all positions – tabled

The Chair mentioned that this topic was tabled at the virtual meeting in February and opened for discussion withing the WG again. Tom Dauzat asked why it was tabled. The Chair explained that the issues were the lack of information and definition of where and how to document this information. There was a request to share an example of Decal with the ratio on all taps. The Chair committed to bringing an example to the next meeting.

10. New business

a) Update on section review:

i) Section 2 - Kyle Heiden/Guang Yuan/Samragui Datta Roy

a) Sam – to review status of documents for next meeting

The team requested more time.

ii) Section 6 – Miguel Plascencia

Miguel requested some more time. He believes he is ready but wants to review again

iii) Section 9 – Dan Sauer/Rich Frye/Samragui Datta Roy

a) Ratio connection section – should we update?

b) 50/60 Hz conversion formulas – C57.12.90 Annex?

Dan shared their findings on the section. The main issue brought up is that some outdated methods are still in the standard. It was mentioned that this only follows IEEE C57.12.90. The

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Chair mentioned that the issue is that more modern methodologies should also be added to this section.

A motion was made to move the existing methodology for ratio measurement to an annex for reference and update the section with more modern methodologies specific for voltage regulators. Moved by Tom Dauzat and Seconded by Miguel Plascencia. Discussion: the WG requested examples of how the measurement would be made and how to validate the measurement. Unanimously approved.

There was also a topic related to whether or not to include sound testing conversion between 50Hz to 60Hz that already exists in IEEE C57.12.90. Juan Castellanos mentioned that the conversion factors were developed using transformers as reference. Juan volunteered to share some information related to this with the WG.

iv) Section 10 – Kyle Heiden/Sebastian Rehkopf/Craig Colopy

a) Kyle to work with Craig on updates from new C57.131

No changes noted

v) Section 11 – Steve Shull

a) More to come – based on new TF

Still working on this

vi) Annexes – Craig Colopy/Lee Matthews

a) Annex C – Wording to include from June 2024 meeting

- (1) Note: The closed loop circuit the series transformer of Figure C.5 is shown in is floating. If implementing this circuit in a specific design, manufacturers have various means to remedy this condition.

This was agreed on the previous virtual meeting and will be added to the draft.

b) Review updated prints for figures in annex C

Dan shared the diagrams he came up with and a request for some changes were made by the WG. Dan will update the drawings and share them again. There was also a request for the PR to be shown in the diagram.

11. Future meetings

Thursday, March 27th, Granite 3, Hyatt Regency, Denver, CO

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Possible virtual meeting – June 2025

IEC TC14 / IEC General Meeting – possible WG meeting – New Dehli – India & virtual – September 2025

IEEE C57 Fall 2025 Meeting – Bonita Springs, FL

Volunteers to host other meetings / times / places?

12. Closing of Meeting

Motion to adjourn the meeting by Kyle and seconded by Samragui

Submitted by: Nabi Almeida

Date: March 25, 2025

18 Members in attendance:

First Name	Last Name
Rehan	Ali
Robert	Allison
Nabi	Almeida
Samragui	Dutta Roy
Thomas	Dauzat
Juan	Gonzalo Castellanos Gonzales
Ramadan	Issack
Alex	Macias
Lee	Matthews
Miguel	Plascencia
Ion	Radu
Sebastian	Rehkopf
David	Rohrer
Dan	Sauer
Stephen	Shull
Christopher	Slattery

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Jimmy	Smith
Wilson	Tranum

19 Guests in attendance:

First Name	Last Name
Prudhvi Anand	Bhattiprolly
Craig	Colopy
John	Crutty
Scott	Digby
Fernando	Duarte
James	Gardner
Vijay	Gunja
Mick	Kasonga
Evan	Knapp
Nihat	Kosedagi
Justin	Minikel
Thomas	Propts
Martin	Rave
Eric	Schleismann
Joe	Schumack
Chris	Steineman
Tim	Tillery
Reinaldo	Valentin
Jeremy	Van Horn

Minutes from the working group meeting March 27, 2025, at 1:00 PM MDT with 15 in attendance.

1. Opening of meeting and introductions

The chairman called the meeting to order at 1:00 pm.

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2. Record attendance

A quorum check was performed, and quorum was not achieved, only 12 members out of 27 members were present.

3. Approval of agenda

No quorum, so it is not possible to approve.

4. Approval of the Monday minutes

No quorum, so it is not possible to approve.

5. WG documentation review – patents & copyrights

Patent Slides were displayed. No patents claims were brought up by the attendees. The IEEE Copyright Policy and Code of Behavior were displayed.

6. Discussion

There was discussion on the location for the entry of the universal control cable into the control enclosure. The consensus was for the entry to be at the bottom of the enclosure. No motion was made due to lack of a quorum.

There was discussion on adding handles or lifting devices to the control enclosure. The consensus was that this should be an accessory when specified. No motion was made due to lack of a quorum.

There was discussion on how to best provide the ratio information at each tap. The consensus was that the method to provide the information should be added as an informative annex and provided when specified by the customer. If a decal or drawing is used, the part number of the decal or drawing should somehow be referenced on the nameplate. No motion was made due to lack of a quorum.

There was discussion on how to perform sound tests at 50 Hz or correct the measured values if the sound test was performed at 60 Hz. No motion was made due to lack of a quorum.

There will be a meeting in Bonita Springs, FL during the Fall 2025 Transformers Committee Meetings.

A virtual meeting may be held prior to the Fall Transformers Committee meeting. A possible time for the virtual meeting is in late May or early June.

7. Future meetings

a) Possible virtual meeting in June 2025

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b) IEC TC14 / IEC General Meeting – possible WG meeting – New Dehli – India & virtual – September 2025

c) IEEE C57 Fall 2025 Meeting – Bonita Springs, FL

8. Closing of Meeting

The meeting was adjourned at 2:40 pm.

Submitted by: Lee Matthews

Date: March 28, 2025

12 Members present:

First Name	Last Name
Rehan	Ali
Robert	Allison
Samragui	Dutta Roy
Thomas	Dauzat
Juan	Gonzalo Castellanos Gonzales
Lee	Matthews
Miguel	Plascencia
Dan	Sauer
Stephen	Shull
Christopher	Slattery
Jimmy	Smith
Wilson	Tranum

3 Guests present:

First Name	Last Name
Evan	Knapp
Thomas	Propts
Tim	Tillery

PC57.15.01 – Pad-Mounted Compartmental-Type Step-Voltage Regulators – Kyle Heiden

Kyle Heiden presented the following minutes from the working group meeting March 25, 2025, at 7:00 AM MDT with 20 in attendance.

- 1) Welcome and Chair's Remarks
- 2) Circulation of Attendance Sheets
 - a. A total of 17 attendees were present in person, with three additional attendees joining via Teams. 15 attendees requested membership, which was granted due to this being the first WG meeting. Therefore, a total count is as follows:
 - i. 15 Members
 - ii. 5 Guests
- 3) Presentation and approval of meeting Agenda (motion by Dan Sauer / Seconded by Steve Schull) – approved without opposition.
- 4) Reviewed Approved PAR with WG – Kyle Heiden
- 5) New Business
 - a. Call for volunteers for WG leadership:
 - i. Vice Chair: Samraghi Dutta Roy
 - ii. Secretary: Miguel Plascencia
 - b. Reviewed initial document outline. Current outline is as follows:
 - i. 1 – Overview
 - ii. 2 – Normative References
 - iii. 3 – Definitions
 - iv. 4 – Ratings (including BIL ratings)
 - v. 5 – Tests
 - vi. 6 – Service Conditions
 - vii. 7 – Construction
 - viii. 8 – Installation
 - ix. 9 – Accessories
 - x. 10 – Other Requirements
 - c. Divide up and assign section to WG members
 - i. Request for volunteers will be sent via email after the meeting
- 6) New Business for next WG meeting:
 - a. Review section assignments and discuss additional sub-section content
- 7) Action – Kyle Heiden to coordinate next WG meeting for May 2025 (virtual)
- 8) Motion to Adjourn (motion by Steve Shull / Seconded by Dan Sauer) – approved without opposition.

Submitted by: Kyle Heiden

Date: March 26, 2025

Attendance:

Last Name	First Name	Affiliation
Almeida	Nabi	Prolec GE
Smith	Jimmy	Howard Industries
Matthews	Lee	Howard Industries
Minikel	Justin	Eaton
Sauer	Daniel	Eaton
Tillery	Timothy	Howard Industries
Colopy	Craig	Retired from EATON
Schindler	Stefan	Maschinenfabrik Reinhausen
Shull	Stephen	BBC Electrical Services LLC
Ali	Rehan	Siemens Energy, Inc.
Jarosz	Patrycja	IEEE SA
Tranum	Wilson	Siemens-Energy
Plascencia	Miguel	PG&E
Dutta Roy	Samraghi	Siemens Energy Inc
Slattery	Christopher	FirstEnergy
Issack	Ramadan	AEP
Knapp	Evan	Eaton
Heiden	Kyle	Eaton

██████ P3467.5 – Supply Chain and Asset Traceability for Energy (SCATE) – Energy Transformation Devices – Alicia Farag

Jerry Murphy and Steve Shull presented the following minutes from the working group meeting March 25, 2025, at 9:30 AM MDT with 56 in attendance.

1. Chair called the meeting to order at 9:30 am MDT. Paper rosters were circulated to record attendance.
2. Chair called for identification of essential patents pertaining to the work of this TF. None brought forward. Copyright policy and participant behavior slides were presented.
3. Total attendance was 56 with 49 members and 7 guests. Those requesting membership were granted membership.
4. Meeting content
 - a. Presented an overview of P3476 core reference standard
 - b. Presented the working version of the transformer data model
 - c. Agreed to review the in-scope asset subtypes and update as needed
5. Next meeting will be a virtual meeting with the date to be determined.

6. Meeting adjourned at 10:45am MDT.

Submitted by: Alan Traut, Secretary

Date: 03/25/2025

Attendance:

Name	Affiliation	Role	Name	Affiliation	Role
Nabi Almeida	Prolec GE	Member	Jerry Murphy	Chen Moore and Associates	Member
Alex Ayala	ERMCO	Member	Joel Pacas	IFD Technologies	Member
Jared Bates	Oncor Electric Delivery	Member	Dwight Parkinson	Eaton Corp	Member
Prudhvi Bhattachiprolu	AES	Member	Vinay Patel	Con Edison of NY	Member
Kevin Biggle	Weidmann	Member	Miguel Plasencia	PG&E	Member
Jason Bravoin	Weidmann	Member	Nicholas Post	WEC Energy Group	Member
Darren Brown	Howard Industries	Member	Martin Rave	IFD Technologies	Member
Thomas Callsen	Weldy Lamont Assoc.	Member	Robert Reepe	Georgia Power	Guest
Noah Chesser	Oncor Electric Delivery	Member	Mason Rush	Central Moloney	Member
Brian Conneighon	Cleveland Cliffs	Guest	Joe Schumack	Ameren	Guest
John Crofty	Ameren	Member	Ewald Schweiger	Siemens Energy	Member
Thomas Dazat	AEP - SWEPCO	Member	Stephen Shull	BBC Electrical Services, Inc.	Member
Fernando Duarte	Hitachi Energy	Member	Jim Spaulding	City of Fort Collins	Member
Alicia Farag	Locusview	Chair	Joseph Tedesco	Hitachi Energy	Member
Sanford Fong	Georgia Power	Member	Tim Tillery	Howard Industries	Guest
Vazmin Galindo	Quality Switch	Member	Alan Traut	Howard Industries	Secretary
Carlos Gaytan	Prolec GE	Member	Steve Tsai	JST Power Equipment	Guest
Brad Greaves	Weidmann Electrical Technology	Member	Reinaldo Valentin	Duke Energy	Member
Ken Hampton	BGE/Exelon	Member	Jeremy Van Horn	IFD Technologies	Member
Ramadan Issack	American Electric Power	Member	John Vartanian	National Grid	Member
Yeounsoo Kim	JST Power Equipment	Member	Aparna Vedantham	Virginia Transformer	Member
Gary King	Consultant	Member	Josh Verdell	ERMCO	Guest
Nicholas Koinis	CenterPoint Energy	Member	Orlando Vrbinez	JST Power	Guest
Andrew Larison	Hitachi Energy	Member	Shelby Walters	Howard Industries	Member
Alejandro Macias	Centerpoint Energy	Member	Bruce Webb	Knoxville Utilities Board	Member
Tim-Felix Mai	Siemens Energy	Member	Stephen Wolbach	Ameren	Member
Nicholas Manske	Oncor Electric Delivery	Member	Jiahao Xie	S&C Electric	Member
Tyler Morgan	Duke Energy	Member	Michael Zarnowski	Carte International Inc.	Member

PC57.167 – Guide for Monitoring Distribution Transformers – Gary Hoffman

This working group did not meet.

Task Force on Transformer Efficiency and Loss Evaluation – Phil Hopkinson

Phil presented the following minutes from the task force meeting March 24, 2025, at 9:30 AM MDT with 146 in attendance.

1. Welcome

Chair Hopkinson welcomed the attendees.

2. Roster

146 were in attendance.

3. Approval of Agenda

Approved.

4. Approval of the Minutes of the Last Meeting – St. Louis
5. Our Agenda for Denver Thoughts on DOE Final Rule

Mr. Hopkinson presented the slides embedded above. He noted that EIA is a component part of the US DOE. In the study EIA did prior to the NOPR they stated 0.2% load growth due to energy efficiency. Since then, EIA has redone their projections twice. The most recent revised the growth rate to 3.75%. DOE wanted to reduce core loss with the final rule. In 2016 they noted 95% of transformers used GOES. Final Rule requires 75% GOES, 25% amorphous steel. Mr. Hopkinson noted final rule 10CFR431 part K is better than the NOPR. (See above presentation Slide page 4)

6. Guest Speaker Peter Ferrell

Discussion

Peter Ferrell, Director of Government Relations at NEMA gave the above presentation.

The opportunities are:

- a. Rescind all transformers from future DOE rulemaking.
- b. Extend rulemaking cadence to 12 years (longer runway between rulemakings – 3 presidential terms).
- c. Remove TSL-3 through TSL-5 products from future rulemaking.

NEMA is open to working with interested stakeholders on any next steps.

7. Poll and thoughts

A three-question straw poll was conducted of attendees in the room.

- a. How many disagree with the rule? Very many hands opposed the rule. 1 hand was in support of the rule.
- b. Will weights and costs increase due to the rule? @15 hands raised yes it will. 1 hand raised that weights and costs would decrease with the rule.
- c. Will efficiencies improve with amorphous? No one raised their hand.

Q&A

8. Assignments for next meeting
9. Next meeting date and location
10. Adjourn

Submitted by: Paul Orr

Date: 03/25/2025

Meeting Attendance Follows (146 people signed in):

Jerry Allen, Metglas, Inc.
Javier Arteaga, Hitachi Energy
Alex Ayala, Power Partners, Inc.
Donald Ayers, Ayers Transformer Consulting
Cheryl Basel, WEG Transformers USA Inc.
Jared Bates, Oncor Electric Delivery
Andrew Berman, S&C Electric
Edwin Betancourt, Siemens Energy
Kevin Biggie, Weidmann Electrical Technology
David Blew, Retired (PSE&G)
Dominique Bolliger, HV Technologies
Jeffrey Britton, Phenix Technologies, Inc.
Darren Brown, Howard Industries
Thomas Callsen, Weldy-Lamont Associates
Deniss Carr, GE Grid Solutions
Raymond Chapa, WEG Transformers USA Inc.
Paul Chisholm, IFD Technologies
Eunyoung Cho, Hico-America
Stefano Comerio, LTC Group
Brian Conneighton, Cleveland-Cliffs
Noah Cresser, Oncor Electric Delivery
Janet Crockett, Fayetteville PWC
Tim Dappen, Cargill
Antonio Di Biase, Tempel
Jeffrey Door, The H-J Family of Companies
William Elliott, SWEPCO AEP
William Ellis, AMEREN
Fadi Fayad, ASD Inc
Bruce Forsyth, Cargill
Kevin Frye, Central Moloney, Inc.
Renjie Fu, ERMCO/V&F Transformer
Bob Fyrer, Dupont
Jose Gamboa, H-J Family of Companies
Carlos Gaytan, Prolec GE
Rafael Grajeda, EATON Corporation
Richard (Luke) Granbois, IFD Technologies
Kendrick Hamilton,
Michael Hardin, H-J Family of Companies
Sergio Hernaidez, Hammond Power Solutions
Giovanni Hernandez, Virginia Transformer
Jean Hernandez, Georgia Tec NEETRAC
John Herron, Raytech USA
John Hipchen, Copper Development Assn.
Thomas Holifield, Howard Industries
Philip Hopkinson, HVOLT Inc.
Mohammad Iman, MGM Transformer Company
Jose Izquierdo, Siemens-Energy
Karl Jakob, Cargill
Sheldon Kennedy, Sheldon P. Kennedy Engineering LLC
Vladimir Khalin, K V Consulting
Qasim Khan, NEETRAC - Georgia Tech

Brian Klaponski, Carte International Inc.
 Ken Klein, Johnson Coil
 Gillbert Kozer, Northeast Transformer
 Patrick Kozer, Northeast Transformer
 Jason Lambert, JST Power
 Andrew Larison, Hitachi Energy
 Andrew Lawless, Potencia Partners
 Moonhee Lee, Hammond Power Solutions
 Aleksandr Levin, Weidmann Electrical Technology
 Jacky Lin, Fortune Electric
 Parry Lively, Tempel
 Colby Lovins, Federal Pacific
 Mark Lowther, Kruger Products Inc
 Marilia Machado Riberio, GE
 Alejandro Macias, Center Point Energy
 Kushal Mahajan, EATON Corporation
 Tim-Felix Mai, Siemens Energy
 Jinesh Malde, M & I Materials
 Swapnil Marathe, Megger
 Bryan Marquardt, Cleveland-Cliffs
 Daniel Martinez, JFE Shoji Power Canada
 Jim McBride, JMX High Voltage
 Joseph McBride, JMX High Voltage
 Ken McKinney, UL Solutions
 Tim Menter, Lincoln Electric System
 Fernando Meza, Power Partners, Inc.
 Rhea Montpool, Schneider Electric
 Elena Morales, Siemens Energy
 Andre Moreno, Siemens Energy
 Hugo Murillo, The H-J Family of Companies
 Jerry Murphy, Chen Moore & Associates
 Ismael Naja, EATON Corporation
 Aniruddha Narawane, EATON Corporation
 Shawn Nun, Hitachi Energy
 Tommy Nunn, JST Power
 Steven Oakes, WEG Transformers USA Inc.
 Austin Ortega, Siemens-Energy
 Dwight Parkinson, EATON Corporation
 George Partyka, PTI Transformers
 George Payerle, Carte International Inc.
 Harry Pepe, Phenix Technologies, Inc.
 Jason Perkins, Moehn Electrical Sales
 Daniel Posadas, Prolec S. A.
 Jarrod Prince, ERMCO
 Ion Radu, Hitachi Energy
 Adnan Rashid, Measurement Canada / ISED
 Tony Roiss, Custom Materials Inc
 Mason Rush, Central Moloney, Inc.
 Fernando Salinas, Power Partners, Inc.
 Alberto Sandoval, EATON Corporation
 Jaber Shalabi, VanTran
 Michael Shannon, Rea Magnet Wire
 Masoud Sharifi, Siemens Gamesa
 Shihey Xras Shen, GE Grid Solutions
 Stephen Shull, BBC Electrical Services, Inc.
 Chris Slattery, First Energy

Jimmy Smith, Howard Industries
Steven Snyder, Hitachi Energy
Muhammad Abdullah Sohail, Trench Canada
Brian Sonnenberg, General Electric
Jim Spaulding, City of Fort Collins
Mike Spurlock, Spurlock Engineering Services, LLC
Stefan Srebert, Brockhaus
David Stankes, 3M
Kerwin Streich, Siemens Energy
Dragan Tabakovic, Hubbell Power
Chris Talbert, JST Power
Erik Tarengo, ULSUN Electric
Val Tatu, Powersmitus
Joseph Tedesco, Hitachi Energy
Vijay Tendulkar, EATON Corporation
Michael Thibault, Pacific Gas & Electric
Andreas Thiede, Highvolt
Ryan Thompson, Burns & McDonnell
Tim Tillery, Howard Industries
Fernando Tirado, Prolec GE
Alan Traut, Howard Industries
Jeremy Van Horn, IFD Technologies
John Vartanian, National Grid
Pragnesh Vyas, Sunbelt Soloman
David Walker, MGM Transformer Company
David Wallach, Duke Energy
Shelby Walters, Howard Industries
Bruce Webb, Knoxville Utilities Board
Zachery Weiss, WEG Transformers USA Inc.
Michael Wheeler, Hitachi Energy
Joe White, Power Engineers
Devora Wiesel, Con Edison
Guang Yuan, Hitachi Energy
Michael Zarnowski, Carte International Inc.
Martin Rave, IFD Technologies

Task Force Tank Touch Temperature – Bruce Webb

Bruce Webb presented the following minutes from the working group meeting March 24, 2025, at 11:00 AM MDT with 65 in attendance.

1. Call to Order
The meeting was called to order by the Chair (Bruce Webb) Monday March 24, 2025, at 11:00 AM.
2. Welcome and Introduction
The Chair identified the meeting topic and welcomed the attendees.
3. Attendance and Contact Sheets
The Chair distributed attendance sheets and requested that new attendees provide clear and legible email addresses to address the ongoing 123Signup platform issues.
4. Participant Behavior
The Chair displayed several slides identifying the IEEE Codes of Ethics & Conduct expectations and specifically asked the attendees to maintain responsible behavior during

the meeting, to treat one another nicely and with respect, and to avoid injuring others reputation or employment. There was no opposition to the requirements or request.

5. Essential Patent Claims

There was a call for essential patent(s) by the Chair. There were none brought forward. The Chair announced if there was one to let the Chair/Secretary or Vice Chair know. The IEEE essential patent claim slides and guidelines were shown to the TF attendees, and this was recorded by the Secretary.

6. Copyright Policy

The IEEE copyright slides and guidelines were shown to the TF attendees without further discussion, and this was recorded by the Secretary.

7. Quorum Check

As this was a Task Force effort the Chair was directed by SA that no quorum check was necessary.

8. Approval of Agenda

Advance notice of the agenda was emailed to Members prior to the meeting and presented during the meeting for Member consideration. As this was a Task Force effort the Chair was directed by SA that no quorum check was necessary.

9. Approval of Past Minutes

Advance notice of the past unapproved draft minutes was emailed to Members prior to the meeting and presented during the meeting for Member consideration. As this was a Task Force effort the Chair was directed by SA that no quorum check was necessary.

11. Review of TF Directive

To keep the TF meeting on track, Members and Guests were reminded of our Directive from the SC:

- a. ‘... the Task Force is to further investigate perceived safety concerns regarding tank touch temperatures for transformers that are accessible to the public by...
- b. exploring input and feedback from outside resources and experts,
- c. evaluating opportunities to specifically address such concerns, and
- d. making recommendations to the SC for next steps, if any.’

12. Open Discussion

A brief historical timeline was furnished by the Chair beginning with the TF’s Kansas City meeting until present concluding with the understood need for a white paper publication of the TF findings.

Both the January 22, 2024 Final TF SC report and the requested SA DRAFT white paper were discussed.

After a robust discussion, it was determined and agreed upon that no white paper would be necessary and that a revised report combining the January report and DRAFT white paper should be created for submission to the Distribution Transformer SC.

13. New Business

There was no new business.

14. Next Steps

The Chair resolved to create a TF report that would be made available to the SC before the F25 meeting.

The process to create the report would be to create a draft, have it reviewed and vetted by seven (7) TF Members (Dan Mulkey, Ryan Hogg, Jeremy Van Horn, Jim Spaulding, Jean Hernandez-Mejia, and John Vartanian), and later issued to the TF Members for their consideration via email requesting: (1) approval, (2) disapproval with comment, or abstention.

The Chair is resolved to gain majority approval for the report prior to August 2025, issue the report to the Distribution Transformer SC chair by September 2025, and to follow up officially with the SC at the F25 meeting in Bonita Springs, Florida.

15. Next meeting--date and location

There will be no additional meetings following the submission of the revised TF report to the Distribution Transformer SC.

16. Adjournment

The meeting was adjourned by the Chair at 11:40 AM.

Submitted by: Bruce Webb

Date: March 26, 2025

Attendance:

	Last Name	First (Given) Name	Company (Affiliation)
1	Allen	Jerry	Metglas
2	Arias-Garcia	Josh	Midwest Electrical TX Services
3	Attaguile	Sam	3M
4	Ayala	Alex	Power Partners
5	Brown	Darren	Howard Industries
6	Callsen	Thomas	Weldy Lamont
7	Carrizales	Juan Alredo	Prolect GE
8	Chisholm	Paul	IFD Technologies
9	Connelighton	Brian	Cleveland Cliffs
10	Crockett	Janet	Fayetteville PWC
11	Crotty	John	Ameren
12	Doerr	Ronny	SGB-SMIT GROUP
13	Gardner	James	Prolec-GE Waukesha
14	Grandbois	Richard(Luke)	IFD Technologies
15	Greenhaw	Matthew	OG&E
16	Hernandez-Mejia	Jean	GT-NEETRAC
17	Hershberger	Ben	Midwest Electrical TX Services
18	Hogg	Ryan	Bureau of Reclamation
19	Hsiao	YuTso "Allen"	Shihlin Electric
20	Jang	Donghyun	LS Electric
21	Jarosz	Patrycja	IEEE-SA
22	Kim	Heonsu	LS Electric
23	King	Gary	Consultant
24	Kozer	Patrick	Northeast Transformer
25	Kurz	Andreas	Maschinenfabrik Reinhausen
26	Larison	Andrew	Hitachi Energy
27	Leal	Fernando	Prolec Energy
28	McKinney	Ken	VL Solutions
29	Minikel	Justin	Eaton
30	Morgan`	Tyler	Duke Energy
31	Murphy	Jerry	Chen Moore & Associates
32	Pacas	Joel	IFD Technologies
33	Park	Dean	Hyosung HICO
34	Park	Jaeyong	LS Electric

35	Panesar	Parminder	Virginia Transformer Corporation
36	Parkinson	Dwight	Eaton
37	Payerle	George	Carte International Inc.
38	Peuc	Luka	Koncar D&ST
39	Plascencia	Miguel	PG&E
40	Rapelly	Laxman	Georgia Transformer
41	Rave	Martin	IFD Technologies
42	Reepe	Robert	GA Power Co.
43	Rehan	Ali	Siemens Energy, Inc.
44	Rush	Mason	Central Moloney Inc.
45	Sanchez Rodriguez	Jesus	Vertir
46	Santos	Armindo	Prolect GE
47	Sbravati	Alan	Hitachi Energy
48	Schumack	Joe	Ameren
49	Smith	Ed	The H-J Family of Companies
50	Stankes	Dave	3M
51	Syed	Ali	ComEd
52	Thibault	Mike	PG&E
53	Tillery	Tim	Howard Industries
54	Tsai	Steve	JST Power Equipment
55	Valentin	Reinaldo	Duke Energy
56	Varghese	Ajith	Prolec Waukesha
57	Veeran	Kannan	Georgia Transformer
58	Viereck	Kirsten	Maschinenfabrik Reinhausen
59	Vyas	Pragnesh	Cleveland Cliffs
60	Watson	Joshua	NPPD
61	Webb	Bruce	KUB
62	White	Joe	Power Engineers
63	Wolbach	Stephen	Alabama Power
64	Yeh	Tzu Han "Stanely"	Shihlin Electric
65	Yu	Zachary	Selyuan Toshiba

C.3 Old Business

No old business was discussed.

C.4 New Business

Alan Traut brought a motion to go to ballot for C57.12.37. This motion was unanimously approved.

The Chair announced C57.12.38 single phase pads was published.

The Chair announced C57.12.36 distribution substation transformers succeeded in making it through ballot.

C.5 Chairman's Closing Remarks and Announcements

The Chair had no closing comments to the SC.

C.6 Adjournment

The Chair adjourned the meeting as provided in the meeting agenda at 10:45AM.

List of Attendees and Affiliations:

Last Name	First Name	Company / Affiliation	Role/Status
Abdalla	Isaac	HICO America	Guest
Adams	Kayland	Prolec-GE Waukesha	Guest
Ali	Rehan	Siemens Energy, Inc.	Guest
Almeida	Nabi	Prolec GE	Member
Alonso	Mario	Georgia Transformer	Member
Amin	Mihirkumar	Eaton	Requesting Membership
Arteaga	Javier	Hitachi Energy	Member
Ayala	Alex	Ermco	Requesting Membership
Bargone	Gilles	FISO	Guest
Bates	Jared	Oncor Electric Delivery	Member
Berube	Jean-Noel	Rugged Monitoring Quebec Inc	Guest
Bhattiprolu	Prudhvi Anand	AES	Guest
Biggie	Kevin	Weidmann Electrical Technology	Member
Blaszczyk	Piotr	Specialty Transformer Company	Member
Bradshaw	Garrett	Howard Industries, Inc.	Requesting Membership
Brown	Christopher	San Diego Gas and Electric	Guest
Cai	Jim	JSHP Transformers	Guest
Carrizales	Alfredo	PROLEC	Guest
Castro	Fidel	San Diego Gas & Electric	Requesting Membership
Chesser	Noah	Oncor Electric Delivery	Member
Colopy	Craig	Retired from EATON	Member
Conneighton	Brian	Cleveland-Cliffs	Guest
Crockett	Janet	Fayetteville PWC	Guest
Crotty	John	Ameren	Member
Da Silva	Roberto	Maschinenfabrik Reinhausen	Guest
Dappen	Tim	Cargill	Requesting Membership
Dauzat	Thomas	AEP-SWEPCO	Member
de Oliveira	Luiz	Hitachi Energy	Requesting Membership

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Duarte	Fernando	Hitachi Energy	Requesting Membership
Dulac	Hakim	Advanced Power Technologies	Member
Dutta Roy	Samragani	Siemens Energy Inc	Member
Espindola	Marco	Hitachi Energy	Guest
Fausch	Reto	RF Solutions	Guest
Fernandez	Miguel	Braintree Electric	Requesting Membership
Ferreira	Marcos	FEMA	Member
Flores	Hugo	Ermco	Guest
Fujimori	Alan	Romagnole	Guest
Garcia	Miguel	Hitachi energy	Member
Gardner	James	Prolec-GE Waukesha	Member
Garza	Gilberto	Prolec GE	Requesting Membership
Gaytan	Carlos	Prole GE	Member
Ghosh	Rob	GE Vernova	Member
Gorzin	Alireza	Black & Veatch	Requesting Membership
Grandbois	Luke	IFD Technologies	Guest
Greaves	Brad	Weidmann Electrical Technology, Inc	Guest
Greenhaw	Matthew	OG&E	Guest
Guinand	Benjamin	Power Magnetics	Guest
Gunja	Vijay	Powertechlabs	Requesting Membership
Hamilton	Kendrick	ERMCO	Member
Hampton	Ken	BGE	Member
Heiden	Kyle	Eaton	Member
Hemchandra	Shertukde	UHART/DDI	Member
Hernandez-Mejia	JeanCarlos	NEETRAC GEORGIA TECH	Guest
Hoffman	Saramma	PPL	Member
Hogg	Ryan	Bureau of Reclamation	Guest
Holifield	Thomas	Howard Industries Inc	Guest
Hopkinson	Phil	HVOLT.com	Member
HSIAO	ALLEN	Shihlin Electric	Guest
Issack	Ramadan	AEP	Member
Izquierdo	Jose	Siemens energy	Requesting Membership
Janakiraman	Balaji	Virginia Transformer	Guest
Jarosz	Patrycja	IEEE SA	Guest
Joe	White	POWER Engineering	Guest
John	John	Virginia Transformer Corp.	Member
Kennedy	Sheldon	Sheldon P Kennedy Engineering	Guest
Khan	Qasim	Neetrac- Georgia Tech	Requesting Membership
Kim	Yeounsoo	JST powe Equipment	Requesting Membership
King	Gary	Consultant	Member

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Klaponski	Adam	Carte International inc	Guest
Klaponski	Brian	Carte International Inc	Member
Koinis	Nicholas	Cebterpoint energy	Guest
Kosedagi	Nihat	ERMCO	Requesting Membership
Kowalski	Rafal	Hitachi Energy	Guest
Kumar	Arvind	Delta star inc	Requesting Membership
Kwan	Landen	NRC	Guest
Lapointe	Sylvain	Rugged Monitoring	Guest
Larison	Andrew	Hitachi Energy	Member
Leal	Fernando	Prolec ge	Guest
Lee	Moonhee	Hammond Power Solutions	Member
Levin	Aleksandr	Weidmann Electrical Technology	Guest
Li	Weijun	Braintree Electric Light Department	Member
lively	Parry	Tempel	Requesting Membership
Lopes	Ricardo	Efacec	Guest
Macias	Alejandro	CenterPoint Energy	Member
Mai	Tim-Felix	Siemens Energy	Member
Manske	Nicholas	Oncor Electric Delivery	Requesting Membership
Masoud	Nader	Central Moloney	Requesting Membership
Matthews	Lee	Howard Industries	Member
Melle	Thomas	HIGHVOLT	Requesting Membership
Mellin	Toni	Vaisala	Guest
Merrill	Logan	OMICRON	Guest
Minikel	Justin	Eaton	Guest
Murcia	Fredy	Siemens Energy	Guest
Murillo	Hugo	There H-J Family of Companies	Requesting Membership
Murphy	Jerry	Chen Moore & Associates	Member
Naderian	Alireza	Potencia Partners	Guest
Narawane	Aniruddha	Eaton	Member
Neild	Kris	Megger	Guest
Panesar	Parminder	Virginia Transformer Corp	Requesting Membership
Parkinson	Dwight	Eaton Corp	Member
Patel	Vinay	Con Edison	Member
Payerle	George	Carte International	Member
Pepe	Harry	Phenix Technologies	Guest
Peuc	Luka	Končar D&ST	Guest
Plascencia	Miguel	Pacific Gas & Electric	Requesting Membership
Post	Nicholas	WEC Energy Group	Guest
Radu	Ion	Hitachi Energy	Member
Rave	Martin	IFD Technologies	Member

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Ray	Sheila	US Nuclear Regulatory Commission	Guest
Reepe	Robert	Georgia Power Co	Member
Rodriguez	Juan	Magnetron	Guest
Ronchi	Rodrigo	WEG Transformers México	Member
Sauer	Daniel	Eaton	Member
Sbravati	Alan	Hitachi Energy	Guest
Schleismann	Eric	Southern Company	Guest
Schleismann	Eric	Southern Company	Member
Schumack	Joseph	Ameren	Guest
Sethi	Kabir	Hitachi Energy Germany Ag	Guest
Sewell	Jeremy	Quality Switch, Inc.	Guest
Sharpless	Samuel	Rimkus	Guest
Shull	Stephen	BBC Electrical Services, LLC	Member
Sinclair	Jonathan	Black and Veatch	Guest
Slattery	Christopher	FirstEnergy	Guest
Smith	Jimmy	Howard Industries	Guest
Snyder	Steven	Hitachi Energy	Member
Sohail	Muhammad Abdullah	Trench Limited	Requesting Membership
Stank	Markus	MR	Member
Stankes	David	3M	Guest
Tarango	Erik	Olsun electric	Guest
Tatu	Val	Powersmiths	Member
Taylor	Marc	JFE Shoji Power Canada	Guest
thibault	mike	pacific gas and electric	Member
Thiede	Andreas	HIGHVOLT Dresden	Guest
Tillery	Timothy	Howard Industries	Member
Tirado	Fernando	Prolec GE	Requesting Membership
Traut	Alan	Howard industries	Member
Vartanian	John	National grid	Member
Velasquez	Juan	Magnetron sas	Requesting Membership
Verdell	Joshua	ERMCO	Member
Villa	Hector	Ecuatran SA	Guest
Vyas	Pragnesh	Cleveland Cliffs	Member
Washburn	Alan	Burns & McDonnell	Guest
Watson	Joshua	NPPD	Guest
Webb	Bruce	Knoxville Utilities Board	Member
Weiss	Zachery	WEG	Member
Weyandt	Paul	Schneider Electric	Requesting Membership
Will	Elliott	AEP SWEPCO	Guest
Wolbach	Stephen	Alabama Power Company	Guest

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Xie	Jiahao	S&C Electric Company	Guest
Yeh	Stanley	Shihlin electric	Guest
Yuan	Guang (Grace)	Hitachi Energy	Member
Yun	Joshua	Virginia Transformer Corp	Member
Zarnowski	Michael	Carte	Member

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 - 21 guests - 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 it 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.

Annex D

- 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.

Annex D

- 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 several 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.

Annex D

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
- 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:
 - o Discussion on timeline for Implementation
 8. New Business:
 - o Overview of IEEE C57.12.59 current status
 - o Status of figures to be updated
 - o Discussion on challenges and best practices in updating this guide
 9. Next Steps and Action Items
 - o Assigning additional updates
 - o Setting deadlines and follow-up actions
 10. Meeting Adjournment
- Joseph Tedesco moved to approve the agenda; Ken Klein seconded. Motion passed unanimously
- Chair presented call for patents. No claims presented.
- Chair presented Copyright and behavior policies.
- Chair presented options for proceeding as approved previously with minor changes.
- The Chair had distributed the minutes of the last meeting and the virtual meeting on Feb 18.
- Discussion to extend the lower impedance limit for type 1 transformer in figure 1. Proposed limit was 1%
- Other improvements have been suggested by Vijay Tendulkar in our virtual meeting. The chair asked if anybody has additional suggestions? None provided
- 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
- Meeting adjourned at 11:25 am MDT.

Annex D

- 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.

-

- Meeting Attendees:

-

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	Protec GE	Guest
Weyandt, Paul	Schneider Electric	Chair
Radu, Ion	Hitachi Energy	Guest
Tatu, Val	Powersmiths	Member
Adams, Kayland	Protec 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

Annex D

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	Izquierdo	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

Annex D

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

Annex E Transformers and Reactors for HVDC Applications Subcommittee

March 24, 2025, 4.45 pm local time – Mineral Hall BC Hyatt Regency Denver, Denver, Colorado

Chair: Klaus Pointner (klaus.pointner@ieee.org)

Vice Chair: tbd.

Secretary: tbd. (minutes voluntarily taken by Eric Davis – Secretary WG IEC/IEEE 60076-57-129)

E.1 Introduction / Attendance / Approval of the Agenda / Essential Patent Issues

There was a total of 32 people in the meeting, 14 members and 18 guests present. 4 new requests for membership were received

Call for patents (essential patent claim) and IEEE copyright policy have been addressed.

Actual membership prior the Spring 2025 meeting is shown below (E-Mail addresses are not shown due to privacy reasons):

First Name	Last Name	Affiliation
Sean	Barker	Hitachi Energy
Camilo	Casallas	Trench Limited
David	Caverly	Trench Limited
Solomon	Chiang	The Gund Company
Marcos	Czernorucki	Hitachi Energy
Eric	Davis	Consultant (on his own)
Evgenii	Ermakov	Hitachi Energy
Peter	Heinzig	Weidmann Electrical Technology
Kurt	Kaineder	Trench Austria GmbH
Sylvain	Plante	Hydro-Quebec
Christoph	Ploetner	Siemens Energy
Klaus	Pointner	Trench Austria GmbH
Thomas	Prevost	Weidmann Electrical Technology
Ulf	Radbrandt	Hitachi Energy
Leslie	Recksiedler	Manitoba Hydro
Hossain	Sai	Trench Limited
Lina	Sandsten	Hitachi Energy
Michael	Sharp	Trench Limited
Dharam	Vir	Prolec GE
Terry	Wong	Trench Canada Limited
Waldemar	Ziomek	PTI Transformers

14 out of 21 members were present, thus quorum was met.

The agenda for this meeting, that was distributed via E-mail on March 20, 2025, was presented. No comments received. Christoph Ploetner made a motion to approve the agenda, seconded by Peter Heinzig. The agenda was unanimously approved.

The list of all attendees of the meeting is shown below (E-Mail addresses not shown due to privacy reasons):

First Name	Last Name	Affiliation	Membership Status	Request Membership
Anthony	Alexander	Hitachi Energy	Guest	
Gilles	Bargone	FISO	Guest	
Naveen	Bhardwaj	Trench Group	Guest	Yes
Camilo	Casallas	Trench	Member	
David	Caverly	Trench Limited	Member	
Vivian	Chan	Hitachi Energy	Guest	
Solomon	Chiang	The Gund Company	Member	
Marcos	Czernorucki	Hitachi Energy	Member	
Eric	Davis	Consultant	Member	
Peter	Dopplmair	Trench Group	Guest	
Evgenii	Ermakov	Hitachi Energy	Member	
Didier	Hamoir	Transformer Protector Corporation	Guest	
Peter	Heinzig	Weidmann	Member	
Saif	Hossain	Trench Limited	Member	
Patrycja	Jarosz	IEEE SA	Guest	
Reeve	Johnson	Hitachi Energy	Guest	
Laszlo	Kadar	Laszlo & Associates	Guest	Yes
Kurt	Kaineder	Trench Austria	Member	
Omar	Mendez Zamora	Prolec	Guest	
Filip	Mikulecky	Koncar Power Transformers Ltd.	Guest	
Anthony	Natale	HICO America	Guest	
MARCELINO	PEREZ	Prolec	Guest	Yes
Christoph	Ploetner	Siemens Energy	Member	
Klaus	Pointner	Trench Austria GmbH	Member	
Bertrand	Poulin	Hitachi Energy	Guest	
Adnan	Rashid	Measurement Canada	Guest	
Michael	Sharp	Trench Limited	Member	
Christopher	Whitten	Hitachi Energy	Guest	
Stefan	Wirth	Coil Innovation GmbH	Guest	Yes
Terry	Wong	Trench Limited	Member	
Samuel	Young	Hitachi Energy	Guest	
Waldemar	Ziomek	PTI Transformers LP	Member	



Qualification for membership of the requests received will be checked and the applicants will be notified.

E.2 Approval of the minutes of the Fall 2024 meeting in St. Louis

The minutes of the spring meeting as distributed by E-mail on March 3, 2025 have been presented. No comments were given. Evgenii Ermakov made motion to approve the agenda, seconded by Terry Wong. The minutes have been unanimously approved.

E.3 Chair's Remarks

The Chair introduced himself to the SC. He provided an overview of his 37+ years in the industry.

SC Members should have received an email from IEEE about being added to the IEEE Group Roster for PE/TR/HVDC SC. Members should confirm their participation in the SC following the instructions in the email.

The Chair made the following appointments for the SC Officers:

Waldermar Ziomek was appointed to be Vice Chair.

Saif Hossain was appointed to be Secretary.

E.4 Status of the Entity WG 57.132 for development of the Guide for vibration testing of oil immersed HVDC converter transformer (Chairman: Dr. Jun Deng)

The SC HVDC is sponsoring this Entity WG. Therefore, future work of this WG is reported to this subcommittee. The actual status of the WG is outlined in the presentation submitted by the WG chair Jun Deng prior to the Spring 25 meeting. Unfortunately, the WG chair could not come to this meeting but is encouraged to do so for the Fall 2025 meeting in Bonita Springs (FL).

There was no WG meeting between the Fall 2024 and the Spring 2025 meeting. The next meeting is planned to be held in Nanchang, China in April 2025.

Status Report:

During the second WG meeting, 28 experts participated, from China Southern Power Grid, State Grid Corporation of China, North China Electric Power University, etc.)

[illegible]

Jun Deng(CSG) and Zhicheng Xie(CSG) introduce the Draft of PC57.132 part by part, respectively. The draft has been fully discussed by WG members, some suggestions have been proposed:

- a) In the Chapter 5, it should point out that when conducting multiple vibration tests on the same transformer, it is advisable to maintain consistent sensor positions for comprehensive analysis.
- b) Supplement the requirements for fiber optic vibration measurement in Chapter 7, including sensor types and installation forms, as well as requirements for voltage and current measurement devices such as load rate, range, frequency response, etc.
- c) In Chapter 7, it is necessary to separately describe the internal vibration measurement and external vibration measurement of transformers.
- d) The technical requirements for vibration sensors require a clear distinction between steady-state and transient technical conditions.

Date and Location of Last Working Group Meeting:
19th, October 2024, Nanjing, China (Third WG meeting)



- ◆ WG Chair Dr. Jun Deng introduce the Agenda, Minutes from Prior Meeting and IEEE Policies (include Call for Patents, copyright policy).
- ◆ Agenda and Minutes from Prior Meeting are approved by motion without opposition respectively.

- e) Attention to copyright issues in the layout diagram of vibration testing points.
- f) The case in Appendix C needs to be supplemented with the basic information of the tested equipment, vibration distribution, vibration signal extraction and analysis, etc.

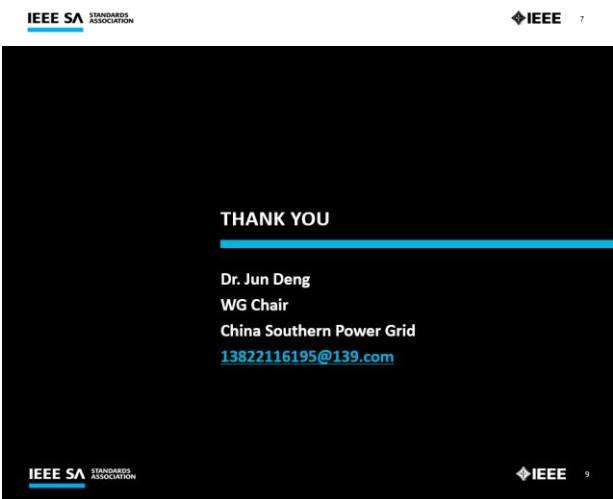
CURRENT STATUS OF WORKING GROUP

According to the comments of the last meeting (19th, October 2024 in Nanjing, China), the WG has made revisions to the draft and plans to hold the 4th WG meeting for discussion in the near future (April 2025, Nanchang, China). Besides, we plan to go to Sweden and discuss with ABB company this year (this autumn).

NEXT PLAN

■ Next WG Meeting

The next meeting is planned to be held at Nanchang China in April 2025.



Details of the WG see: <https://sagroups.ieee.org/57-132/>

Although no meeting has been reported, an updated draft has been reported. The SC chair asked back to the WG chair, how this draft was done without a meeting. There was no feedback prior to this meeting.

The SC shall stay involved in this WG. Participation in person would be possible in an expert function. However, the ballot will be organized according to the rules for such entity PAR's (one entity – one vote), but this SC has to agree that a draft proposed by the WG for balloting is in the required shape to start the ballot process.

E.5 Dual logo standard IEC/IEEE 60076-57-129 (WG Chair: Waldemar Ziomek)

In the time slot of the SC meeting, the WG held a meeting. Details can be found in the annex of these minutes.

E.6 Future Work of this Sub Committee

The chairman of the SC encouraged members and guest to propose work items and activities that shall be considered by this SC. Input is welcome – please contact the SC chairman directly.

E.7 Old Business

There was no old business

E.8 New Business

There were three items of new business.

First, an entity PAR proposal “Guide for arc test of liquid-Immersed High-Voltage Direct-Current (HVDC) converter transformers” sponsored by China was presented. The SC agreed to send questions regarding the need for this standard. Chris Ploetner will work together with the SC chair on a firm reply to the originator of the entity PAR proposal.

Second, an entity PAR proposal “Guide for General Technical Requirements and Test Methods for Valve Reactor in High Voltage Direct Current (HVDC) Transmission System using Line Commutated Converters (LCC) technology” sponsored by China was presented. The HVDC SC responded that this is not the appropriate SC for the work and referred it to Power Electronics. These reactors depend on the capabilities of the thyristors and associated valve design and are dependent on proprietary knowledge. Typically, these reactors are part of the overall thyristor valve design.

Third, an entity PAR proposal “Guide for composite current switching test of vacuum-type on load tap changer for converter transformer” by China was proposed for vacuum LTCs for Converter Transformers. After discussions with the former SC chair Ulf Radbrandt, the Sponsor agreed that this topic applies to all transformers. It will be referred back to the Transformers Committee.

E.9 Adjournment

The meeting was adjourned at 5:28pm.

Annex:

Minutes of Meeting of the WG meeting “Dual logo standard IEC/IEEE 60076-57-129” – March 23, 2025

Minutes of Meeting of the WG meeting “Dual logo standard IEC/IEEE 60076-57-129” – March 27&28, 2025

Minutes of Meeting

WG Rev. to IEEE Standard 60076-57-129 IEC/IEEE International Standard Power transformers-Part 57-129: Transformers for HVDC applications

March 24, 2025, 5:30 pm local time – Hyatt Regency Denver, Colorado

Chair: Waldemar Ziomek (wziomek@ptitransformers.com)

Secretary: Eric Davis (esetdavis@aol.com)

1. Attendance / Approval of the Agenda / Essential Patent Issues

The meeting took place in the course of HVDC SC meeting. Thirteen (13) of thirty-three (33) members and sixteen (16) guests for a total of twenty-nine (29) people attended. Three (3) guests requested membership. A quorum was not in attendance. The list of attendees is shown below:

First Name	Last Name	Company	Member/ Guest
Anthony	Alexander	Hitachi Energy	G
Gilles	Bargone	FISO	G
Naveen	Bhardwaj	Trench Group	G
Camilo	Casallas	Trench Limited	M
David	Caverly	Trench Limited	G-RM
Vivian	Chan	Hitachi Energy	M
Marcos	Czernorucki	Hitachi Energy	M
Eric	Davis	Consultant	M
Evgenii	Ermakov	Hitachi Energy	M
Niklas	Gustavsson	Hitachi Energy	G
Didier	Hamoir	Transformer Protector Corporation	G
Peter	Heinzig	Weidmann Electrical Technology	M
Saif	Hossain	Trench Group	M
Reeve	Johnson	Hitachi Energy	G
Laszlo	Kadar	Laszlo & Associates	G-RM
Omar	Mendez	Prolec GE	M
Filip	Mikulecky	Koncar Power Transformers LTD	G
Anthony	Natale	HICO America	G
Marcelino	Perez	Prolec	G-RM
Christoph	Ploetner	Siemens Energy	M
Klaus	Pointner	Trench Austria GmbH	M
Bertrand	Poulin	Hitachi Energy	M
Adnan	Rashid	Measurement Canada	G
Michael	Sharp	Trench Limited	M
Christopher	Whitten	Hitachi Energy	G

First Name	Last Name	Company	Member/ Guest
Stefan	Wirth	Coil Innovation GmbH	G
Terry	Wong	Trench Canada Limited	M
Samuel	Young	Hitachi Energy	G
Waldemar	Ziomek	PTI Transformers	M

G: Guest

G-RM: Guest – Requesting Membership

M: Member

2. Agenda

The agenda for the WG meeting was presented by the WG chair.

3. Status Report as presented by the WG chair

The WG Chair:

- Reviewed the scheduled meetings for this fall
 - WG Meeting – Monday 3/24, 4:45 pm – 6:00 pm
 - WG Meeting/IEC – Thursday, 3/27, 1:00 pm – 5:00 pm
 - WG Meeting/IEC – Friday, 3/28, 8:00 am – 12:00 pm
- Reviewed the approved PAR Scope of Work
- Reviewed details of the existing revisions
 - Added explanation of LI and SI based on Insulation Coordination Studies.
 - Decided against adding a section on monitoring devices and systems.
 - Align definitions with IEC/IEEE 65700-19-03 Bushings for DC Applications.
 - Add LCC schemes in Annex A.
 - Discussed real and apparent power requirements.
 - The review of IEC Std 61378-3 Converter Transformers Part 3: Application Guide identified only a few sections for inclusion in this document.
 - Discussed impacts of parallel AC and DC lines.
 - Proposed to remove Annex F Service Losses.
- Reviewed text regarding Active/Reactive Power
 - 5.2.6 Reactive Loading – Reviewed proposed text.
 - It was suggested that P-Q diagrams be added for LCC and VSC
- Reviewed text regarding LTC
 - There was discussion on defining overload as 1.2 pu in this document versus the current reference to other standards.
 - There was discussion on why a number of operations was included when referring to a high number of operations per year. This will be discussed on Thursday when a representative of an LTC Manufacturer is present.
- Reviewed the proposed timeline
 - First draft – F24

- First draft review and correction – S25
- Ballot within SC – F25
- Ballot Standard – S26
- Submit to RevCom – F26

The slides shown by the WG Chair will be posted to the website.

4. Old Business

There was no old business

5. New Business

There is no new business

6. Adjournment

The meeting was adjourned at 5:50pm.

Minutes of Meeting

WG Rev. to IEEE Standard 60076-57-129 IEC/IEEE International Standard Power transformers-Part 57-129: Transformers for HVDC applications

March 27, 2025, 1:00pm-4:30pm local time – Hyatt Regency Denver, Colorado, Mineral Hall DE

March 28, 2025, 8:15am-10:30am local time – Hyatt Regency Denver, Colorado, Mineral Hall DE

Chair: Waldemar Ziomek (wziomek@ptitransformers.com)

Secretary: Eric Davis (esetdavis@aol.com)

1. Welcome and Attendance

The WG held two additional meetings after the IEEE Transformer Committee meeting. These were meetings five and six of the WG. Eight (8) of thirty-three (33) members and eight (8) guests for a total of sixteen (16) people attended the meeting on Thursday. Five (5) of thirty-three (33) members and four (4) guests for a total of nine (9) people attended the meeting on Friday. Four (4) guests requested membership. A quorum was not achieved. The list of attendees is shown below by day:

First Name	Last Name	Company	Thursday 3/27	Friday 3/28	Member/ Guest
Patrycja	Jarosz	IEEE SA	X		G
Christoph	Ploetner	Siemens Energy	X	X	M
Bertrand	Poulin	Hitachi Energy	X		G
Marcos	Czernorucki	Hitachi Energy	X	X	M
Waldemar	Ziomek	PTI Transformers	X	X	M
Frank	Trautman	Siemens Energy	X	X	M
Sebastian	Rehkopf	Reinhausen Germany	X	X	G-RM
Laszlo	Kadar	Laszlo & Associates	X		G-RM
Klaus	Pointner	Trench Austria GmbH	X		M
Janusz	Szczechowski	Maschinenfabrik Reinhausen GmbH	X		G
KyungChan	An	Hyosung	X		G
Peter	Heinzig	Weidman	X		M
Vivian	Chan	Hitachi Energy	X		M
Abhishek	Jha	IEC / Hitachi Energy	X	X	G-RM
Jonathan	Walmsley	IEC	X	X	G-RM
Eric	Davis	Consultant	X	X	M
Kabir	Sethi	Hitachi Energy Germany Ag		X	G

G: Guest

G-RM: Guest – Requesting Membership

M: Member

2. Patent claims

IEEE Patent Policy Slides presented. There were no conflicts or patent claims.

3. Agenda

The agenda for the WG meeting was presented by the WG chair, including the agenda for fifth and sixth meeting of WG.

- Review comments received on:
 - Active & Reactive Loading
 - LTCs.
 - Other portions of the standard.

4. Status Report and Discussion

The following additions/edits/revisions to the HVDC transformer standard were discussed

- Reviewed active and reactive loading comments.
- Reviewed LTC comments.
- Reviewed LCC schemes details in Annex A
- Discussed real and apparent power requirements (P-Q tables or diagrams)

The following action items were assigned.

WG 60076-57 Action Item List

Section	Description	Assigned
	P-Q Diagrams	Marcos/Christoph
13.1 LTC	Impact of harmonic content (freq, mag) on LTC Operation - Check with Manufacturers	Sebastian
13.2 LTC	Recommendation on paragraph with # of operations (30,000)	Sebastian
Section 9.2.1	Agreed measurement at two frequencies is for type test only. Provide wording	Marcos
Section 9.21 Overexcitation	5% limit of differences, Background (defined in 12.90?)	Eric
Section 5.5 & 5.6 (both new)	Description of LCC and VSC Operation (Main body, annex)	Frank
Section 7.4	Wording of VSC Harmonic Calculations; total load losses due to harmonics Less than 5% no separate test	Jonathan
Annex A	Figure A.2 Direction of arrows Consistency in how all diagrams are shown	Frank
Annex A	Figure A.2, Delta-Star?	Frank
Annex A	Review all examples	Frank
Section 8.3.2.2, 9.3	Switching Impulse - Change?	Jonathan
	General Review and Comments	All

5. Old Business

There was no old business

6. New Business

There is no new business

7. Adjournment

The meeting was adjourned at 4:30pm on Thursday and 10:30am on Friday.

Annex F Instrument Transformers Subcommittee

Chair: David Wallace

Nothing Submitted

Annex G Insulating Fluids Subcommittee

2025 March 26 – 3:00PM – 4:15PM

Hyatt Regency, Denver, CO

Chair: Stephanie Mabrey

Vice-Chair: Jerry Murphy

Secretary: Mike Bonn

1. Call to Order 3:00PM
2. Stephanie Mabrey introduced herself as Chair, Jerry Murphy Vice-Chair, Mike Bonn Secretary
3. Presented IEEE Patent Policy, Copyright Policy and Code of Conduct
4. Opening Remarks
 - i. Reminded that SC minutes are due to Stephanie Mabrey and Mike Bonn by April 10 and WG and TF minutes are due to Insulating Fluids Subcommittee (IFSC) Secretary Mike Bonn within 15 business days of their meetings and are to include attendance
 - ii. Please update website with minutes – tc-webmaster@ieee.org
 - iii. Reminded of Membership requirements to attend 3 out of last 5 meetings (there was confusion about this, but it was resolved prior to meeting) and be a member in good standing of IEEE PES and IEEE SA.
 - iv. IEEE Staff Contact – Patrycja Jarosz p.jarosz@ieee.org
5. Roll Call of SC Members – Quorum requirement -28
 - i. 38 members signed in from of a total of 55 members achieving quorum
 - ii. 88 attendees. 50 Guests. 14 requested memberships.
 - iii. QR Code was primary method for attendance – 2 people had problems and reported after.

Role	Last Name	First Name	Role	Last Name	First Name
Guest	Abdalla	Isaac	Guest	Kurz	Andreas
Guest	Balaji	Janakiraman	Guest	Kwan	Landen
Guest	Beaudoin	James	Guest	Labh	Ashwini
Guest	Bhardwaj	Naveen	Guest	Lewand	Lance
Member	Biggie	Kevin	Guest	Lizcano	Cesar
Member	Boettger	William	Guest	Loiselle	Luc
Member	Boman	Paul	Chair	Mabrey	Stephanie
Secretary	Bonn	Mike	Member	Malde	Jinesh
Guest	Bradshaw	Garrett	Guest	Mani	Balakrishnan
Member	Bradshaw	Jeremiah	Member	Mellin	Toni
Member	Calitz	David	Guest	Murillo	Hugo
Member	Casserly	Edward	Vice-Chair	Murphy	Jerry
Member	Castellanos	Juan	Member	Newbill	Mark
Guest	Cisco-Sullberg	Adriana	Guest	O'Malley	Anastasia
Member	da Silva	Roberto	Guest	Obregon	Daniel
Member	Dappen	Tim	Member	Parkinson	Dwight
Member	Delgado	Gabriel	Member	Perjanik	Nicholas

Guest	Espindola	Marco	Member	Pruente	John
Member	Faur	Florin	Guest	Puleo	Gerard
Guest	Felton	Todd	Guest	Ray	Sheila
Member	Ferreira	Marcos	Member	Raymond	Timothy
Member	Forsyth	Bruce	Member	Reed	Scott
Member	Garcia	Miguel	Guest	Rehkopf	Sebastian
Guest	Gardner	James	Guest	Rock	Patrick
Guest	Garner	Joshua	Member	Rossini	Yuri
Guest	Gaytan	Carlos	Guest	Rutledge	Christopher
Member	Giraldo	Orlando	Member	Saad	Mickel
Member	Gorzin	Alireza	Guest	Sanchez Roseiguez	Jesus
Guest	Greaves	Brad	Member	Sbravati	Alan
Guest	Greenhaw	Matthew	Guest	Schott	Cody
Guest	Gustafsson	Niklas	Guest	Shaikh	Salahuddin
Member	Gyore	Attila	Member	Sinclair	Jonathan
Guest	Hamoir	Didier	Guest	Solano	William
Member	Harper	Robert	Member	Steeves	Gregory
Member	Hayes	Roger	Guest	Tenyenhuis	Ed
Guest	Hernandez	Ronald	Member	Thompson	Ryan
Guest	Holifield	Thomas	Guest	Tillery	Timothy
Guest	Jarosz	Patrycja	Guest	Van Dreek	Cole
Member	John	John	Guest	Velasquez	Juan
Guest	Kaineder	Kurt	Guest	Werelius	Peter
Guest	Keels	Thomas	Guest	Whitten	Christopher
Guest	Khan	Qasim	Member	Woods	Deanna
Guest	Kim	Yeounsoo	Guest	Yeboah	Kwasi
Guest	Kiparizoski	Zan	Guest	Yuan	Guang

RM = Requested Membership

6. A **Motion** to approve both the Fall 2024 Minutes and the Spring 2025 Agenda as was made by Ed Casserly and 2nd by Mark Newbill. Motion unanimously approved.

7. The list of open PARS was presented.

8. WG & TF Reports Presented

i. **WG C57.155 – Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformers** Chair: Alan Sbravati - presented

- i. Quorum achieved
- ii. TF1 – Statistical Analysis of Database – Lance Lewand Doble
- iii. State of analysis shown, proposed new limits for gases
- iv. 70,000 records from offline measurements / 35,000 records from online measurements
- v. Requested more data to c57data@ieee.org Subject: PC57.155 Revision
- vi. TF2 - Normalized Energy Index – Alan Sbravati Hitachi Energy
- vii. Equations of NEI and gas distributions for synthetic esters were presented
- viii. TF4 – Reviewing Annexes – Jinesh Malde Midel
- ix. Summary of Michel Duval presentation discussed

- x. New case studies needed on failed ester-filled transformers
- xi. 2 Year PAR extension approved
- xii. MOTION: Request PAR Extension by Alan Sbravati – Unanimously Approved.
- xiii. See Appendix A for Unapproved Minutes

9. Task Force on a Guide to Corrosive Sulfur – Lance Lewand

- i. 89 People in attendance
- ii. Met to determine Title, Scope and Purpose so a PAR could be registered.
- iii. Title: IEEE Guide to Evaluating Corrosive Sulfur Issues in Liquid-Filled Transformers and Reactors
- iv. Purpose: This guide assists in determining the presence of corrosive and potentially corrosive sulfur compounds in transformer and reactor insulating liquids and construction materials and also provides information to evaluate the risk of copper and silver sulfide formation with mitigation recommendations.
- v. Motion to accept Title, Purpose and Scope approved
- vi. Addressed possible task forces and got names of volunteers
- vii. MOTION: Proceed to PAR by Lance Lewand. Unanimously Approved.
- viii. See Appendix B for Unapproved Minutes

10. WGC57.130 – Guide for the use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil Filled Transformers and Reactors Chair: Bruce Forsyth

- i. Met and had quorum
- ii. Struggle to get data for liquids other than mineral oil. See Appendix C for minutes
- iii. See Appendix C for Unapproved Minutes

11. WG/TF C57.146 Chair Paul Boman

- i. No meeting held
- ii. Draft guide on ballot, close date is April 12, 2025
- iii. 33% response rate. Will remind ballot pool via email
- iv. No Minutes

12. WG C57.139 - Guide for the Interpretation of Gases Generated in Liquid-Type Load Tap Changers (Expires 12/31/25) Chair: Rainer Frotscher

- i. Quorum not met
- ii. TF1 sufficient data for proposing gas/ratio limits on 10 LTC types from most sample data collected.
- iii. The TF leaders (4) update WG on proposed guide edits. Additional case studies for equipment with known faults.
- iv. First statistical evaluations done, ongoing work on Triangle use, etc.
- v. On-track for expected completion of draft guide before the PAR expiration date
- vi. See Appendix E for Unapproved Minutes

13. WG C57.166 – Guide for Acceptance and Maintenance of Insulating Liquids in Transformers and Related Equipment. Chair: Tom Prevost

- i. No Meeting
- ii. 350 Comments being reviewed. PAR extended. Resolution expected summer 2025.

14. WG C57.637 – Guide for the Reclamation and Reconditioning of Insulating Liquids

Chair: Stephanie Mabrey

- i. Short meeting combined with C57.170
- ii. Quorum met
- iii. PAR Extension approved
- iv. Straw ballot resolution team to have document ready by fall 2025
- v. MOTION: 2 Year PAR Extension by Stephanie Mabrey. Unanimously Approved.
- vi. Scott Reed expressed concern that C57.637 cannot move forward without completion of C57.166
- vii. See Appendix G for Unapproved Minutes

**15. WG C57.104 Guide for Interpretation of Gases Generated in Mineral Oil-Immersed
(Expires 12/31/2029)** Chair: Ed teNyenhuis – Luis Cheim presented on behalf of Ed.

- i. Discussed data and collection templates
- ii. Monitoring templates discussed
- iii. Cleaning of monitoring data
- iv. Data interpretation
- v. See Appendix H for Minutes

16. Old Business – None

17. New Business-None

18. Next IFSC Meeting: 2025 October 19-23 Bonita Springs, FL

19. Adjournment at 4:11PM

Submitted by Mike Bonn, IFSC

Appendix A

Working Group for Guide for the Interpretation of Gases Generated in Natural and Synthetic Ester Liquid Type Transformers C57.155

Monday, March 24, 2025
09:30 – 10:45, Denver, CO, USA

Chairman: Alan Sbravati
Vice Chair: Lance Lewand
Secretary: Attila Gyore

The meeting was called to order at 09:30 by the Chair.

There were 29 of 42 members present during the meeting. There were 54 guests, 19 membership requests, in sum 83 attendees.

The quorum was achieved.

1. Attendance list:

1	Kyungchan	An	Guest
2	Paul	Boman	Member
3	Mike	Bonn	Guest
4	Jeremiah	Bradshaw	Member
5	Griffin	Burk	Guest
6	Edward	Casserly	Member
7	Sudip	Chanda*	Guest
8	Luiz	Cheim	Member
9	Matt	Chu	Guest
10	Marcos	Czernorucki	Guest
11	Tim	Dappen	Guest
12	Roberto	Da Silva	Member
13	Zack	Draper	Member
14	Will	Elliott	Guest
15	Marco	Espindola*	Guest
16	Todd	Felton	Guest
17	Hugo	Flores	Guest
18	Bruce	Forsyth	Member
19	Jean-Philippe	Gagnon	Guest
20	James	Gardner*	Guest
21	Joshua	Garner*	Guest
22	Gilberto	Garza	Guest
23	Slaven	Goglia	Guest
24	Alireza	Gorzin	Member
25	Bill	Griesacker*	Guest
26	Attila	Gyore	Secretary
27	Robert	Harper	Member
28	Roger	Hayes*	Guest

29	Florian	Hermann*	Guest
30	Ronald	Hernandez	Guest
31	Traci	Hopkins	Member
32	Miljenko	Hrkac*	Guest
33	RYU	hyounggon	Guest
34	Balaji	Janakiraman	Guest
35	Braxton	Jones	Guest
36	Franjo	Kelemen	Guest
37	Egon	Kirchenmayer	Member
38	Rafal	Kowalski*	Guest
39	Arvind	Kumar*	Guest
40	Andreas	Kurz*	Guest
41	Sylvain	Lapointe	Guest
42	Lance	Lewand	Vice-Chair
43	Cesar	Lizcano	Member
44	Stephanie	Mabrey	Member
45	Jinesh	Malde	Member
46	Kumar	Mani*	Guest
47	Francis	Mantoan	Guest
48	Toni	Mellin	Member
49	Filip	Mikulecky	Guest
50	Justin	Minikel	Guest
51	Ali	Naderian*	Guest
52	Ashmita	Niroula*	Guest
53	Parminder	Panesar*	Guest
54	Pedro	Pedro*	Guest
55	Nick	Perjanik	Member
56	John	Pruente	Guest

57	Manuel	Quinones	Guest
58	Timothy	Raymond	Member
59	Scott	Reed	Member
60	Yuri	Rossini	Member
61	Chris	Rutledge*	Guest
62	Mickel	Saad	Member
63	Hakan	Sahin	Guest
64	Amitabh	Sarkar	Member
65	Alan	Sbravati	Chair
66	Alaor	Scardazzi	Guest
67	Marcus	Schaffer	Guest
68	Dario	Segovic	Guest
69	Jonathan	Sinclair	Member
70	Amitkumar	Singh	Guest

*membership requested

71	Markus	Soeller	Guest
72	Markus	Stank*	Guest
73	Greg	Steeves	Member
74	Leonard	Torchia	Guest
75	Valentina	Valori	Guest
76	Matthew	Webb	Guest
77	Zachery	Weiss	Member
78	Drew	Welton*	Guest
79	Christopher	Whitten	Guest
80	Deanna	Woods	Member
81	Jeffrey	Wright	Guest
82	Asam	Yu	Guest
83	Hongzhi	Zhang	Guest

2. Agenda for approval
 - A. Welcome & Introduction
 - B. Attendance and Establishment of Quorum
 - C. Call for Patent Disclosure
 - D. IEEE Copyright Policy
 - E. Approval of Fall 2024 Minutes
 - F. Working Group Activities
 1. Task Force 4: Task Force 4 – Jinesh Malde - Updates on the Annexes B to F
 2. Task Force 3 – Stu Chambers - Updates on the general document
 3. Task Force 2 – Alan Sbravati → Updates on Normalized Energy Index
 4. Task Force 1 – Lance Lewand → Luiz Cheim, General Discussion
 - 5 . General discussion
 - H. Old Business / New Business
 - Request for PAR extension
 - I. Next Meeting
 - J. Adjournment
3. Chair posted the Patent Claim. No claims were made.
4. Chair presented the copyright policy slides.
5. The agenda of the meeting was presented by the chair. Agenda for Spring 2025 was approved, motion: Jeremiah Bradshaw, second: Traci Hopkins
6. Fall 2024 Minutes was approved.
7. Discussions on Task Forces' work
 - a. TF1 Statistical Analysis of Database, TF Leader: Lance Lewand, Doble
Actual state of the data analysis and new proposed limits for gases were shown
About 70000 records from offline measurement and 35000 records were received from online measurement.
There is still opportunity to submit more dataset,
Please send them to c57data@ieee.org, subject: PC57.155 Revision
 - b. TF2 Normalized Energy Index, TF Leader: Alan Sbravati, Hitachi Energy
Equations of NEI and gas distributions for synthetic and natural esters were presented
 - c. TF3 Revision of the Document TF Leader: Stuart Chambers, EPRI International
There was no progress to report
 - d. TF4 Reviewing Annexes TF Leader: Jinesh Malde, MIDEL & MIVOLT Fluids
Summary on Michal Duval's presentation was discussed
New case studies are needed on failed ester filled transformers

The chair mentioned the plan of completing a first draft for a Straw Ballot by the F25 meeting.

8. New Business/Other Items for Discussion
 - a. A 2-year PAR extension request was approved
9. Next meeting at Fall 2025, Bonita Springs, Florida, USA
10. The meeting was adjourned at 10:44, on time

Attila Gyore, Secretary
Alan Sbravati, Chair

Appendix B

Task Force Corrosive Sulfur Issues in Transformers and Reactors

- This task force met on Tuesday, March 25th, 2025 at 11:00 AM at the Hyatt Regency in Denver, CO
- 90 people attended the meeting
- Roberto Da Silva of Reinhausen offered to be the secretary of this committee and his offer was accepted.
- Meeting minutes and agenda were not approved as there is not yet an active PAR
- Reviewed guidelines for IEEE SA Meetings
- Reviewed IEEE Codes of Ethics and Conduct
- Reviewed Copyright and Patent Policies and no essential patents were claimed
- Goal of the meeting was to come to agreement on a Title, Scope and Propose so that a PAR could be applied for, and secondarily to get a start on assignments of task forces in anticipation that a PAR would be approved.
- This document will be published as a Guide not a standard
- Several titles, scope and purpose were prepared in advanced for discussion at this meeting. A lively discussion took place among those attending in rewording and editing the three items. The term “liquid-filled” was used in the title as the preferred term.
- Based on conversations and debates held in the meeting, the following title, scope and purpose were prepared with the full participation of the audience and are stated as:

TITLE:

IEEE Guide to Evaluating Corrosive Sulfur Issues in Liquid-Filled Transformers and Reactors

SCOPE:

This guide applies to liquid-filled transformers and reactors and addresses:

1. *Introduction/Description of corrosive sulfur*
2. *Adverse effects from corrosive sulfur*
3. *Analytical tests*
4. *Evaluation and guidelines*
5. *Electrical tests*
6. *Risk Assessment and mitigation procedures*
7. *Case studies and examples*
8. *A bibliography of related literature*

The purpose had extensive discussion with about 10 to 15 different wording suggestions. It was finally resolved and stated as follows:

PURPOSE:

This guide assists in determining the presence of corrosive and potentially corrosive sulfur compounds in transformer and reactor insulating liquids and construction materials and also provides information to evaluate the risk of copper and silver sulfide formation with mitigation recommendations.

A motion was made to accept the Title, Scope and Purpose listed above by Ed Casserly, seconded by Griffin Burk. No nays were recorded and the motion passed unanimously.

Suggested Officers for the official working group once the PAR is approved:

Chair: Lance Lewand, Doble Engineering

Vice Chair: Stuart Chambers, EPRI International

Secretary: Roberto Da Silva, Reinhausen

The rest of meeting consisted of requesting volunteers to participate for the following task forces that may implemented once a PAR is approved.

The anticipated task forces were listed as follows:

Structure of the Task Forces and those that volunteered

1. Introduction - In-depth description what corrosive sulfur and the adverse effects in liquid-filled electrical equipment
 - Volunteers were Lance Lewand, Stuart Chambers, Ed Casserly, Roberto Da Silva, Vedantham Aparna, and Andreas Kurz
2. What compounds are known and descriptions
 - Volunteers were Lance Lewand, Stuart Chambers, and Ed Casserly
4. Effects on Metal Surfaces and Solid Insulating Materials
 - Volunteers were Lance Lewand, Stuart Chambers, Roberto Da Silva, and Jinesh Malde
5. Analytical Tests for Corrosive Sulfur
 - Volunteers were Lance Lewand, Stuart Chambers, Griffin Burk, Todd Felton, Joshua Garner, Attila Gyore, and Stephanie Mabrey
6. Electrical Tests
 - Volunteers were Poorvi Patel, Stephanie Mabrey, and someone from Doble Engineering
6. Flowchart on what actions to take
 - Volunteers were Lance Lewand, Stuart Chambers, and Attila Gyore

8. Prevention/Remediation/Mitigation

- Volunteers were Lance Lewand, Stuart Chambers, Roberto Da Silva, Jinesh Malde, and Griffin Burk

We received information from other people that they would like to be involved as well but did not indicate which tasks force.

The next steps are to bring this to Insulating Fluid subcommittee with a motion and then if approved file PAR

Meeting adjourned at 12:12 PM

Sincerely, Lance Lewand and Roberto Da Silva

List if attendees:

Last Name	First Name	Company Name
Viereck	Karsten	Reinhausen
Ansari	Tauhid	Hitachi Energy
Aparna	Vedantham	Virginia transformer corporation
Balakrishnan	Mani	Delta star field service
Boman	Paul	Hsbi&i
Bradshaw	Jeremiah	Bureau of Reclamation
Brekalo	Josipa	Koncar D&ST
Brzoznowski	Steven	BPA
Bule	John	DTE Energy
Burk	Griffin	Ergon
Casserly	Edward	Ergon
Castellanos	Juan	Prolec
Chanda	Sudip	Delta Star Inc
Cheim	Luiz	Hitachi
Cordova	Olivia	Bureau of Reclamation
Crockett	Janet	Fayetteville PWC
Da Silva	Roberto	Maschinenfabrik Reinhausen
Diaconu	Dumitru	Delta Star Inc
Dorpmanns	Luc	Royal SMIT Transformers
Draper	Zachary	Delta-X Research
Espitia	Egui	Reinhausen Manufacturing Inc
Farmer	James	Bureau of Reclamation
Felton	Todd	MVA Diagnostics, Inc.
Filip	Mikulecky	filip.mikulecky@siemens-energy.com
Foata	Marc	MR
Gardner	James	Prolec-GE Waukesha
Garner	Joshua	RESA Power
Geraldo	Magela junior	Siemens-energy

Goglia	Slaven	Koncar Power Transformers Ltd.
Greaves	Brad	Weidmann Electrical Technology, Inc
Gyore	Attila	MIDEL and MIVOLT Fluids Ltd
Hampton	Kevin	Siemens Energy
Harper	Robert	Soltex Inc.
Hayes	Roger	GE Vernova
Hershberger	Benjamin	Midwest Transformer
hyounggon	ryu	HD hyundai electric
Jeong	chanmin	HD Hyundai
Jones	Braxton	SD Myers
Kaineder	Kurt	Trench Austria
Kelemen	Franjo	Koncar Power Transformers Ltd.
Kelemen	Franjo	Koncar Power Transformers Ltd.
Kiparizoski	Zan	Howard Industries
Koprivnjak	Matija	Končar D&ST
Kurz	Andreas	Reinhausen Germany
Labh	Ashwini	Hitachi Energy
Labh	Ashwini	Hitachi Energy
Lewand	Lance	Doble Engineering Company
Lizcano	Cesar	Shell USA, Inc.
Loiselle	Luc	Tetra tech
Malde	Jinesh	MIDEL & MIVOLT Fluids Inc.
Mamede	Gabriel	Siemens Energy
Mantoan	Francis	Siemens Energy
Mabrey	Stephanie	AVO Diagnostic Services
Manzano	Moses	Hyosung HICO
Matt	Chu	Shihlin Electric
Mellin	Toni	Vaisala
Minikel	Justin	Eaton
OMalley	Anastasia	Consolidated Edison Co of NY
Ortiz	Cuauhtemoc	Niagara Power Transformer Corp
Palhatiya	Ajay	Virginia Transformer Corp
Pandya	Manan	Siemens Energy
Park	Jaeyong	LS Electric
Patel	Sanjay	Royal Smit Transformers
Perjanik	Nick	AVO Diagnostic Services
Portillo	Homer	Advanced Power Technologies
Pruente	John	APC Construction llc
Puleo	Gerard	Midel
Robles	Antonio	Bureau of Reclamation
Saad	Mickel	Hitachi Energy

Scardazzi	Alaor	Siemens Energy
Schrammel	Alfons	Siemens Energy
schweiger	ewald	siemens energy
Sebastian	Rehkopf	Reinhausen Germany
Shannon	Michael	Rea Magnet Wire
Singh	Amitkumar	Consolidated Edison Company of New York
Solano	William	Voltyx
Stank	Markus	MR
Stauffer	Jonathon	Bureau of Reclamation
Steeves	Greg	Baron USA, LLC
Thomas	Holifield	Howard Industries
Tillery	Timothy	Howard Industries
Tostrud	Mark	Dynamic Ratings
Van Dreel	Cole	American Transmission Co
Veeran	Kannan	Virginia/Georgia transformer
Villa	Hector	Ecuatran SA
Walters	Shelby	Howard Industries
Weisensee	Matt	PacifiCorp
White	Joe	POWER Engineers
Wright	Jeffrey	Duquesne Light
Yang	Fei	Hitachi Energy
Yong	Zhai	Sieyuan

Appendix C

Working Group for IEEE C57.130: Guide for the Use of Dissolved Gas Analysis to Factory Temperature Rise Test for the Evaluation of Mineral Oil-Immersed Transformers and Reactors

Tuesday, March 24, 2025

8:00 – 9:15 am

Hyatt, Denver, CO, USA

Minutes of Working Group Meeting

Chair: Bruce Forsyth (BF)

Vice Chair/Secretary: Jinesh Malde (JM)

Membership list was updated prior to the meeting to ensure that members had either attended 2 consecutive meeting or 3 out of 5 meetings. Quorum requirement for the meeting was 19 out of 37 members. There were 24 members in the meeting and quorum was met. The Chair showed the behavior expectations, IEEE patent and copyright policies, and asked the participants if there are any claims that should be reported regarding these policies. There were no claims brought up by attendees in the meeting.

The agenda was presented. A motion was made to approve the agenda. With no objections, the agenda was approved. The Chair requested the members to approve the Fall 2024 meeting minutes. Jeremiah Bradshaw made a motion to approve the Minutes. With no objections, the meetings minutes were approved.

The Chair shared the timeline for the revision and mentioned that the working group was at least 1 year behind on the completion of the work and the PAR expires in Dec 2026 however the guide would become inactive in Dec 2025.

Jim Thompson who was past Chair of IEEE C57.130, explained the process used to come up with values listed in Table 2:

- Data on 386 transformers was collected from 4 data sets.
- Transformers ranged from 8.4 MVA to 700 MVA
- Volume of liquid ranged from 1300 gal to 34000 gal.
- All the data was collected and populated in an excel sheet. The values generated in Table 2 were discussed amongst members and guests and was compared to the IEC equivalent standards.

Lance Lewand updated the working group that the data survey on collecting data for mineral oil and ester filled transformers was sent out but only received 2 responses. Patrycja Jarosz from IEEE updated the group that the template prepared to collect the data was very complicated and IEEE was not capable of handling the information currently. A guest mentioned that Standard Association's inability to assist working groups is stalling the process of developing standards. Scott Reed mentioned that discussion on how to handle the situation with regards to storage, anonymization and use of data is ongoing.

The Chair mentioned that he is not in favor of a PAR extension because PAR extensions are generally requested when a working group is nearing the end of their work but need a little more time. Our working group has not even started work on analyzing data for non-mineral oil filled transformers because we have not received sufficient responses from our survey to create statistically reliable recommendations. He suggested that the working group consider focusing on completing the minor edits in the document and go to ballot without including updates for non-mineral oil liquids. The guide can be reopened for revision to add new information on alternative liquids after that. Jim Thompson made the motion to “Stop the review process on the guide due to lack of data on alternative liquids and to proceed with only minor revisions”. Ed Casserly seconded the motion. There were 13 yes and 8 no with no abstentions. The motion carried.

Call for volunteers was made. Zane Kiparizoski, Amitabh Sarkar, Jeremiah Bradshaw and Roberto Da Silva volunteered to help complete the minor revisions to the standard.

Meeting adjourned at 9:15 am.

Respectfully submitted,
Jinesh Malde, Secretary

Meeting Attendees

Last Name	First Name	Status
Forsyth	Bruce	Chair
Malde	Jinesh	Vice-Chair
Boettger	William	Member
Bradshaw	Jeremiah	Member
Castellanos	Juan	Member
Da Silva	Roberto	Member
Draper	Zachary	Member
Felton	Todd	Member
Hollrah	Derek	Member
Jensen	Nick	Member
Khan	Qasim	Member
Kiparizoski	Zan	Member
Kirchenmayer	Egon	Member
Lewand	Lance	Member
Mcbride	Brian	Member
Morales-Cruz	Emilio	Member
Perjanik	Nick	Member
Reed	Scott	Member
Sarkar	Amitabh	Member
Schweiger	Ewald	Member
Thompson	Ryan	Member
Thompson	Jim	Member
Vir	Dharam	Member
Yun	Joshua	Member
Arnold	Elise	Guest
Berube	Jean-Noel	Guest
Biggie	Kevin	Guest
Bonn	Mike	Guest
Botti	Michael	Guest
Bule	John	Guest
Burk	Griffin	Guest
Calil	Wilerson	
Casserly	Edward	Guest

Last Name	First Name	Status
Foata	Marc	Guest
Garcia	Eduardo	Guest
Garner	Joshua	Guest
Garza	Hector	Guest
Goglia	Slaven	Guest
Griesacker	Bill	Guest
Gyore	Attila	Guest
Harper	Robert	Guest
Hayes	Roger	Guest
Hermann	Florian	Guest
Jeong	Chanmin	Guest
Kadar	Laszlo	Guest
Kennedy	Sheldon	Guest
Kurz	Andreas	Guest
Lawless	Andrew	Guest
Lizcano	Cesar	Guest
Loiselle	Luc	Guest
Mabrey	Stephanie	Guest
Manuel	Quinones	Guest
Mellin	Toni	Guest
Mikulecky	Filip	Guest
Murcia	Fredy	Guest
Nims	Joe	Guest
Omar	Mendez Zamora	Guest
Ortiz	Juan	Guest
Patel	Sanjay	Guest
Patel	Monil	Guest
Pedro	Pedro	Guest
Raymond	Timothy	Guest
Robles	Antonio	Guest
Schiessl	Markus	Guest
Shertukde	Hemchandra	Guest
Sinclair	Jonathan	Guest

Last Name	First Name	Status
Singh	Amitkumar	Guest
Stauffer	Jonathon	Guest
Steeves	Greg	Guest
Tanaka	Troy	Guest
Tolcachir	Eduardo	Guest
Van Dreef	Cole	Guest
Viereck	Karsten	Guest
Weiss	Zachory	Guest
Welton	Drew	Guest
Weyandt	Paul	Guest
White	Joe	Guest
Wright	Jeffrey	Guest
Yeh	Stanley	Guest

Appendix D

C57.146 No Meeting Minutes

Appendix E

WG C57.139 Guide for the Interpretation of Gases generated in Liquid-Type Load Tap Changers

Spring 2025 Meeting Minutes
Unapproved

Chair Rainer Frotscher (not present)

Vice Chair John Prunte

Secretary Paul Boman

Meeting: Denver CO USA Tue March 25, 2025 3:15 – 4:30 PM

Attendance record: Total: 50, Members: 20, Guests: 30, with 7 requesting membership.
Quorum was not achieved.

Attendees list: see end of these Minutes.

Agenda

- Welcome
- Membership / Quorum
- Approval of Agenda
- Call for Patent Claims / IEEE SA Copyright Policy
- Approval of Meeting Minutes F24
- Revision of C57.139 – Report of Task Forces TF1 - TF4
- Preparation of Final Document / Balloting
- New Business
- Closing Remarks / Adjourn Meeting

Minutes

1. The WG met Tue, March 25 2025, 3:15 pm. As the Chair was not present, the meeting was held by Vice Chair John Prunte.
2. Vice Chair showed membership list containing 42 members, with an initial count of 20 members attending
⇒ Quorum was not achieved.
3. Vice Chair asked for Essential Patent Claims ⇒ none stated.
4. Slides for Participant Behaviour and IEEE Copyright Policy were shown.
5. Spring 2025 Meeting Minutes were presented but could not be approved, as quorum was not met.
⇒ Approval postponed to F25 meeting.
6. Task Force Reports
 - 6.1. TF1 LTC Data Collection and Evaluation – Zachary Draper reports:
 - Zach Draper presented the current status of TF1 and gave detailed information on the multi-stage process the data underwent.
 - After anonymization and cleansing of data, 167,252 records were available for further evaluations.
 - Statistical calculations have been performed on absolute values, incremental changes between successive samples, rates of changes for individual gases, 3- and 5-gas ratios and other relevant ratios.
 - For the 5 most popular LTC classes (showing the highest number of samples), characteristic values of the statistical distribution of data (percentiles) have been provided for significant gases and gas ratios;

see 6.3.

Additionally, advice on DGA interpretation will be provided for 7 further significant LTC classes.

- To define the parameters which are the most useful to detect developing and imminent fault cases, several options were calculated, based on ROC (Receiver Operating Characteristic) analysis, which is a useful method for assessing the accuracy of model predictions. It has been found that the 90th, 95th and 99th percentiles are the most useful. They will be used for the Guide.
- Annex B will be updated accordingly to represent the new approach and discuss the relevance of the current statistical method (quartiles, U1, U2 limits).

6.2. TF2 Revision of General Section (Chapters 1-4) – Florin Faur reports:

- Draft 4 was distributed in Sep 2024 and discussed within TF2. New proposals from the TF were discussed and implemented.
- Definitions and Bibliography were updated.
- Chapter 4.4 “LTC faults” has to be aligned with Chapter 6.2. “Identification of LTC faults”

6.3. TF3 Revision of Basic Rules for LTC DGA interpretation (Chapter 5) – Deanna Woods reports:

- Draft 3 was distributed within TF3 Feb 2025. TF3 met 3 times and discussed the new Tables showing characteristic values (limit values) for popular and important LTC classes.
- Tables providing the 75th, 90th, 95th and 95th percentiles for LTC classes OAXCB, OAXDB, OAXSB/S, OARCB, OARDB, OVXCB/S, OVXDB, IARDB, IARSB, IVRDB, and IVRCB were set up. For IARDB, the huge spread of values renders the percentiles as ‘not useful’ to detect fault cases. A meaningful advice needs to be worked on.
- Meaningful gases and gas ratios were identified based on the ROC analysis: C2H2, CH4, C2H6, C2H4, CO, TDHG, TDHG/C2H2, C2H4/C2H2, C2H4/C2H6, C2H6/CH4 will be used in the Guide.

6.4. TF4 Revision of Chapter 6: Interpretation of LTC DGA Data – William Solano reports:

- Draft 2 was distributed within TF4 Mar 2025. TF4 held 1 meeting to discuss open topics.
- A revised Result Code Table was set up, which now shows 4 stages and concatenates the percentiles from the Tables in Chapter 5 with the stages:

Percentiles Range	Stage	Code	Description	Recommended Action
<90	1	Normal	No irregularity of gas pattern detected	Continue regular sampling
≥90 .. <95	2	Caution	Weak indication of a fault	Resample 3 months
≥95 .. <99	3	Alert	Strong indication of a fault	Resample 1 month, consider LTC lockout
≥99	4	Alarm	Imminent fault	Stop operation; investigate

- Toni Mellin (Vaisala) asked about specific LTC faults that lead to stage 3 and 4.
⇒ This will be included. TF4 is currently working on a description of LTC faults and which gases / gas patterns they produce (lead: Chris Whitten).
- How to use the Result Code Table will be supplemented by a flowchart, similar to C57.104 ⇒ to be set up.
- Question from audience: Will the guide present any recommendation about the initial years of operation of the tap-changer until the first DGA is taken? Paul Boman (HSB) answered that TF4 is currently working on the right words for such recommendations. For new equipment (and re-energized equipment after maintenance), baseline samples should be drawn and the trend monitored during the 1st year of operation.
- Case studies have been updated with investigations into assignment of typical LTC faults.
- A call was made to collect additional case studies.
- Applicability and use of Triangle #2 will be updated. For exceptional LTC types, there is current activity to replace the additional N zones by density plots with data from popular LTC classes where we have sufficient data.

7. Preparation of final Document / Ballot Process

The timeline of the WG activities which are necessary until the Ballot process can be started was presented. A first Draft of the revised Guide is planned to be sent out to the WG in July 2025 as Straw

Ballot, with feedback required. Patrycja Jarosz (IEEE) stated that a Straw Ballot is decided by the WG only. It is not required for submitting a Guide or Standard for a Ballot.

Comments on this Straw Ballot shall be resolved until the Fall 2025 WG Meeting, where a 2nd Draft will be presented. With this, the Ballot process is planned to be initiated.

8. New Business

8.1. Chris Whitten (Hitachi) requests a statement in the Guide about a combined fluid storage from different LTCs during a maintenance action, which will lead to cross-contamination that can disrupt DGA trending and diagnostic. ⇒ Task for Chris to write a proposal.

8.2. Toni Mellin (Vaisala) stated that CIGRÉ WG A2.69 is currently revising TB455 “Guide for Transformer Maintenance”, which includes some basic information on fluid diagnostic. The revised version is expected for 2025. Toni asks to study the Guide if it contains something relevant for C57.139.
⇒ Task for Toni to provide input.

9. Meeting was adjourned at 4:00 pm.

Attendees list:

First Name	Name	Affiliation	Status/ Membership Request
Anthony	Alexander	Hitachi Energy	Guest
Paul	Boman	The Hartford Steam Boiler	Secretary
John	Bule	DTE Energy	Guest
David	Burke	XCEL Energy	Guest
Edward	Casserly	Ergon	Member
Craig	Colopy	Retired from Eaton	Guest
Roberto	da Silva	MR	Guest ^{*)}
Dumitru	Diaconu	Delta Star Inn	Guest
Zachary	Draper	Delta-X Research	Member
Marco	Espindola	Hitachi Energy	Member
Florin	Faur	Prolec GE	Member
Kyle	Feaster	Xcel Energy	Guest
Todd	Felton	MVA Diagnostics	Member
Jean-Philippe	Gagnon	Qualitrol	Guest
Joshua	Garner	RESA Power	Guest
Niklas	Gustavsson	Hitachi Energy	Member
Attila	Gyore	MIDEL and MIVOLT Fluids Ltd	Member
Kevin	Hampton	Siemens Energy	Guest
Patrycja	Jarosz	IEEE SA	Guest
Chanmin	Jeong	HD Hyundai	Guest
Heonsu	Kim	LS Electric	Guest
Andreas	Kurz	MR	Guest ^{*)}
Ashwini	Labh	Hitachi Energy	Guest ^{*)}
Cesar	Lizcano	SHELL USA, Inc	Guest
Stephanie	Mabrey	AVO Diagnostics	Member
Francis	Mantoan	Siemens Energy	Guest

Tom	Matson	XCEL Energy	Guest ^{*)}
Lee	Matthews	Howard Ind.	Guest
Toni	Mellin	Vaisala	Member
Mark	Newbill	Hitachi Energy	Member
Anastasia	O'Malley	Consolidated Edison Co.	Guest
Verena	Pellon	FPL&NextEra	Guest ^{*)}
Nick	Perjanik	AVO Diagnostics	Member
John	Pruente	APC Construction llc	Vice Chair
Manuel	Quinones	GE Vernova	Guest
Sebastian	Rehkopf	MR	Member
Jonathan	Reimer	FortisBC	Guest
Chris	Rutledge	GE Vernova	Guest
Jesus	Sanchez Rodriguez	Vertiv	Guest ^{*)}
Alfons	Schrammel	Siemens Energy	Guest
Jonathan	Sinclair	Black and Veatch	Member
Jimmy	Smith	Howard Ind	Guest
William	Solano	Voltyx	Member
Cole	Van Dreel	ATC	Member
Kayla	Whitesel	DeltaX Research	Guest
Christopher	Whitten	Hitachi Energy	Member
Deanna	Woods	PTT	Member
Kwasi	Yeboah	GE Vernova	Guest ^{*)}
Samuel	Young	Hitachi Energy	Guest
Joshua	Yun	Virginia Transformer Corp.	Member

^{*)}: requesting membership

Appendix F

C57.166 No Minutes

Appendix G

Working Group for C57.637
Tuesday March 25, 2025
10:00 – 10:30 AM
Denver

The meeting was called to order at 10:06 am by Chair Stephanie Mabrey.

Attendees & Members:

The meeting was attended by 27 guests.

The Working Group (WG) has 30 members and 18 were present so quorum was reached.

1. Kevin Biggie
2. Jeremiah
Bradshaw
3. Paul Boman
4. Mike Bonn
5. Ed Casserly
6. Todd Felton
7. Marc Foata
8. Bob Harper
9. Andy Holden
10. Lance Lewand
11. Stephanie Mabrey
12. Jinesh Malde
13. Scott Reed
14. Mickel Saad
15. Alan Sbravati
16. Jonathan Sinclair
17. Greg Steeves
18. Deanna Woods

Chair's Remarks:

Chairwoman Mabrey (SM) made officer introductions. The Chair then slides containing the IEEE's copyright policy and a call for patents, of which no comments were made.

Quorum:

Quorum was confirmed by Secretary Andy Holden (AH). 18 members were present.

Approval of Minutes:

A motion to approve the Spring 2024 minutes by unanimous consent was made by Ed Casserly and it was seconded by Lance Lewand. The motion carried with no objections or abstentions.

Approval of Agenda:

A motion to approve the meeting agenda by unanimous consent was made by Ed Casserly and it was seconded by Lance Lewand. The motion carried with no objections or abstentions.

Agenda

- 1) Review Copywrite IEEE SA slides
- 2) Call for Patent-Related Information
- 3) Obtain Quorum
- 4) Ballot Resolution items
- 5) Present proposed next steps & timeline
- 6) Conclude

Proposed Next Steps & Timeline:

SM shared this timeline with the general working group.

- **Spring 2025**
 - Initial resolution Committee meeting
 - Par Extension
- **Fall 2025**
 - Present DRAFT document for ballot
 - Bring to subcommittee for ballot
 - MEC Review/Ballot group
- **Spring 2026**
 - Ballot Resolution / Recirculation

Approval of PAR Extension

A motion to extend the PAR by two years was approved by unanimous consent was made by Bob Harper and it was seconded by Mike Bonn. The motion carried with no objections or abstentions.

Ballot Resolution Committee (BRC)

The BRC will plan to meet virtually in April to resolve outstanding items. Additional meetings may be required before the Fall 2025 meeting to stay on timeline.

The BRC member include:

- 1) Stephanie Mabrey (President)
- 2) Scott Reed (Vice-Chair)
- 3) Andy Holden (Secretary)
- 4) Jeremiah Bradshaw (editor)
- 5) Mike Bonn
- 6) Ed Casserly
- 7) Stuart Chambers
- 8) Jinesh Malde
- 9) Jonathan Sinclair
- 10) Ed teNyenhuis
- 11) Deanna Woods
- 12) Gabriel Zamora

Conclusion:

The meeting was concluded at 10:20 am by SM.

Minutes of Meeting

C57.104 Guide for the Interpretation of Gases Generated in Mineral Oil- Immersed Transformers – Working Group

Denver CO – March 25, 2025 1.45pm – 3.00pm

- This was the second working group meeting for the revision of C57.104
- The Chair, Ed teNyenhuis, led the meeting. The Chair introduced the Vice-Chair, Luiz Cheim, and the Secretary, Sami Debass who recorded the attendance and meeting minutes.
- Attendance Rosters were circulated
- There were 234 in attendance (see list below) with 82 members and 152 guests.
- A patent call was made with no reply
- Quorum was achieved.
- Approval of Agenda – motion made by Deanna Woods and seconded by Lance Leward. Motion was approved.
- Approval of Minutes of Last Meeting – motion made by Marcos Espindola and seconded by Ed Casserly. Motion was approved.
- The Chair provided an explanation about DGA data anonymization for Laboratory DGA data and gas monitor DGA data. The DGA data is to be submitted to an IEEE account for anonymization. All attendees will have access to the data. The data will be retained after the completion of the guide revision. The data shall only be used for IEEE working group purposes.
- The Chair presented the DGA Data collection templates. The following comments / changes were requested by the working group:
 - Indication of failure or issue with each row of data either with pull down menu or comment
- The Chair presented the Gas Monitor template. The working group had the below comments / edits:
 - Some sensors will not provide data when below the minimum detection limit. Preferably the user sending the data can clean this, otherwise the Data Analysis Task Force will need to clean this.
 - If there is a failure, the timestamp should be noted in the comments
 - Make it clear that for gases not measured, the user should leave these columns blank
 - For file transfer, it may be required to have a data transfer site due to the potential large size of the files
- A Gas Monitor Conversion file is required for IEEE Staff to convert a gas monitor brand to gas monitor type and sensor type. The following persons volunteered to

prepare this conversion file: Toni Mellin, Zack Draper, Bill Whitehead, Lance Leward and Emilio Morales – Cruz.

- A Data Analysis Task Force will be formed to receive the data from IEEE, perform cleaning, do data analysis and present results to the working group. The following persons volunteered: Zach Draper, Tony Mellin, Luiz Cheim, Sami Debass, Adriana Cisco Sullberg, and Tim Raymond.
- It was requested the Chair send multiple e-mail reminders for the data collection.
- A presentation was made by Toni Mellin -
 - Mistakes in Duval triangle 4 & 5 & proposal to fix the mistakes
 - Proposal to update Duval triangle methods as per 2020 updates from Dr. Michel Duval
 - Corrections to Duval pentagons 1 & 2 and arcing sub-faults
 - Section 6.1 & 6.2 - What to do with online monitoring
 - CIGRE working group A2/D1.67 “Guideline for Online Dissolved Gas Analysis Monitoring” is in the process of starting data collection and data analysis for continuous online DGA monitoring data, this has been discussed to be done with IEEE collaboration
- A presentation was made by Zack Draper -
 - Suggestion to add a 4th status code. See “How to Improve IEEE C57.104-2019 DGA Fault Severity Interpretation” Draper, Dukarm, and Beauchemin. IEEE/PES T&D, 2022
 - Proposed a classification scheme for Oil Preservation types. O2 & N2 clearly affects the DGA statistics. But the association of O2 & N2 gas concentrations or ratios with the actual oil preservation type is somewhat weak (due to lack of data). See Draper & Dukarm, CIGRE Canada, 2024, no. 768, zhdraper@deltaresearch.com
- Lance Leward discussed the importance of translation regarding transformer fault. The word “Fault” is used incorrectly, and it is important that we need to be careful of that.
- There was insufficient time for the other 2 presentations prepared. These will be discussed in the next working group meeting
- There was no new business to discuss.
- A motion to adjourn the meeting was made by Lance Leward and seconded by Marco Espindola. The meeting was adjourned at 15.00.

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Attendance List

Last Name	First Name	Company Name	Member (Y)
Alonso	Mario	Georgia Transformer	Y
Aleksander	Owicz	Hitachi Energy	Guest
Attaullah	Ahmad G	Sabic	Guest
Balaji	Janakron	Virginia Transformers	Guest
Baser	Levent	Hitachi Energy	N
Biggie	Kevin	Weidmann Electrical Technolgy	Guest

Beck	Scott	Trantch	Guest
Betancourt	Edwin	Siemens Energy	Guest
Bradshaw	Jeremiah	Bureau of Reclamation	R
Brett	John	Delta-X Research	N
Boettger	William	Boettger Transformers Consulting LLC	Guest
Boman	Paul	HSB	Y
Bonn	Mike	SOLTEX	N
Brodeur	Samuel	Hitachi Energy	Guest
Burk	Griffin	Ergon	Guest
Casserly	Edward	Ergon	Y
Castellanos	Juan	Prolec GE	Y
Castello	Alonso	Kaedi Energy Solution	Guest
Chanda	Sudip	Delta Star Inc	Y
Chambers	Stuart	EPRI International	Y
Cheatham	Mark	GE	Y
Cheim	Luis	Hitachi Energy	Y
Chen	Kezmen	IFD Technologies	N
Chu	Matt	Shihlin Electric	Guest
S. Cisco sullberg	Adriana	Salt River Project	Guest
Colby	Caleb	Schneider Electric	Guest
Cordova	David	Maddox Industrial	Guest
Cordova	Olivia	Bureau of Reclamation	Guest
Cox	Randy	GE	Y
Crotty	John	Ameren	Guest
Cryer	Rich	DIGITALGRID, Inc	Guest
Dappen	Tim	Cargill	Guest
Debass	Sami	EPRI	Y
Delgado	Gabriel	Invenergy	Y
Dillon	Nikolaus	Dominion Energy	Guest
Doak	Eric	D4 Energy solutions	Guest
Doyle	Lee	Vaisala	Y
Draper	Zachary	Delta-X Research	Y
DA Silvia	Roberto	Maschinefabrik Reinhausen	Y
Duffy	Jesse	Nashville Electric Service	Y
Dukarm	James	Delta-X Research	Y
Dulac	Hakim	APT	Y
Edward	Tolcachir	TTR	Guest
Emilio	Morales - Cruz	Qualitrol	Y
Enmakov	Evgenii	Hitachi Energy	Guest
Elliott	Will	AEP SWECO	Y
Espindola	Marco	Hitachi Energy	Y
Fazlic	Zlatan	Camlin Energy	Y
Faur	Florin	Prolec GE WAUKESHA	Y
Felton	Todd	MVA Diagnostics	Y
Fernandez	Miguel	FEMK	Y
Ferreira	Marcos	Quanta Technology	Y
Finn	Mark	Hitachi Energy	Guest
Forsyth	Bruce	Cargill	Y
Florin	Hugo	ERMCO	R
Franklin	Chris	MG Power Associates	N
Frotscher	Rainer	Reinhausen Germany	N
Fujimori	Alen	Romagnole	Guest
Gagne	Zach	IFD Technologies	N
Gamer	Joshua	Independent Dielectrics	Guest

Gagnon	JeanPhilippe	Qualitrol	Guest
Gara	Lorne	Shermco	Guest
Garcia	Miguel	Hitachi Energy	Y
Gardner	James	Prolec-GE WAUKESHA	Y
Gasparini	Eloy	Mistras	Guest
Garner	Josh	Resa Power	Guest
Garza	Hector	Ovto De Mexico	N
Girgis	Ramsis	Hitachi Energy	Y
Goglia	Slaven	Konias Power Transformer	Guest
Gonzalez	Luis	Conduct Industries	Y
Gorzin	Alireza	Black and Veatch	Y
Gyore	Attila	Midel & Mivolt Fluids LTD	Guest
Guner	Ishmael	Hydro -Quebec	N
Hamoir	Didier	Transformer Protector Corp.	Guest
Hayes	Roger	GE Vernova	Guest
Hernandez	Giovanni	Virginia Transf. Corp	Y
Hernandez	Ronald	Doble Engineering	N
Hernandez-Mejia	Jean Carlos	Georgia Tech Neetrac	N
Herron	William	MR	N
Ho	Chanh Thang	BC Hydro	Guest
Holden	Andy	Ergon	Y
Hollrah	Dereck	Burns & McDonnel	N
Hopkins	Traci	H2Scan	Y
Hsiao	Yutso	Shihlin Electric	Guest
Foata	Marc	MR	Guest
Foata	Marc	MR	Guest
Jakob	Karl	Cargill	Guest
Jarosewski	Marion	Delta Star Inc	Guest
Jarosz	Patrycja	IEEE SA	N/A
John	John	Virginia Transformer Corp.	Y
Jones	Braxton	SD Myers	Guest
Jonak	Ryan	PGE	Guest
Kadar	Laszlo	Laszlo & Associate	Guest
Kasonga	Mick	Oncor Elec	N
Kennedy	Sheldon	Sheldon P Kennedy Engineering	Guest
Keels	Thomas A.	KEelectric Engineering LLC	Guest
Khan	Qasim	NEETRAC- Georgia Tech	Guest
Kim	Yeounsoo	JST Power Equipment	Guest
Kim	Rebecca	CHERYONG ELECTRIC	Guest
Kirchenmayer	Egon	Siemens Energy	Y
Klempner	Dmitriy	SCE	Y
Komel	Lakhani	Siemens Energy	Guest
Kowacki	Rafal	Hitachi Energy	Guest
Kurz	Andreas	MR	N
Kwan	Lanen	US NRC	Guest
Larison	Andrew	Hitachi Energy	Guest
Labh	Sahwini	Hitachi Energy	Guest
Lamontagne	Donald	Arizona Public Service	Y
Lapointe	Sylvin	Rugged	Guest
Lee	KangJtn	Cheryong Electric	Guest
Lewand	Lance	Doble Engineering	Y
Li	Chao	Eaton	N
Li	Jinming	BC Hydro	Y
Li	Weijun	Braintree Electric Light Dept.	Y

Lin	David	IFD Technologies	N
Lizcano	Cesar	SHELL USA INC.	N
Loiselle	Luc	Tetra Tech	Y
Lopez	Richardo	EFACEC	Guest
Lucas	Tiffany	Prolec GE	N
Luke	Wang	BC Hydro	N
Mabrey	Stephanie	Weidmann	Y
Malde	Jinesh	MIDEL & MIVOLT Fluids Ltd	Guest
Mani	Kumar	Duke Energy	Y
Mani	Balakrshnan	Delta Star Inc	Guest
Mahajan	Kushal	Sungrow	Y
Mantoan	Francis	Siemens Energy	Guest
Mats	Bermejo	Hitachi Energy	Guest
Martinez	Alberto	WEG	Guest
Marulanda	Katherine	Magnetron S.A.S	Guest
Mbouombouo	Mama	Hitachi Energy	N
McLaughlin	Pat	PECO	Guest
Megdad	Mohammed	IPS	N
Mellin	Toni	VAISALA	Y
Mannannam	Robert	Maddox Industrial Transf.	N
Miller	Philip	MLGW	N
Moore	Curtis	DIGITALGRID, Inc	Guest
Morgan	Charles	Eversource Energy	Guest
Munoz	Martin	Orto	Y
Murkowski	Emma	Delta-X Research	Y
Murray	David	TVA	Y
Naja	Ismael	Eaton	Guest
Nambi	Shankar	Bechtel Energy	Guest
Newbill	Mark	Hitachi Energy	Y
Niroula	Ashmita	Ergon, Inc	Guest
Nims	Joe	Allen & Hoshall	N
Nolte	Mike	Kiewit	Guest
Obrepon	Daniel	TTE Transformers	Guest
O'Malley	Anastasia	Con Edison NY	N
Pacas	Joel	IFD Technologies	Guest
Panesar	Parminder	Virginia Transformer	Y
Palhatiya	Ajay	Virginia Transformer Inc	Guest
Patel	Poorvi	EPRI	Y
Patel	Vinay	Con Edison	Y
Patel	Rakesh	Hitachi Energy	Y
Pedro	Pedro	EFACEC-TRANSFORMERS	N
Perjanik	Nick	Avo Diagnostic Services	Y
Plisic	Goran	Siemens Energy KPT	N
Pruente	John	Prolec GE WAUKESHA	Y
Quinones	Manuel	GE vernova	Guest
Radu	Ion	Hitachi Energy	Y
Rapelly	Layman	GA Transformer	Guest
Ray	Sheila	US Nuclear Regulatory Commission	Guest
Raymond	Tim	Inductive Reasoning	Y
Reed	Scott	MVA	Y
Reeder	Perry	GE	N
Reimer	Jonathan	Fortis BC	Guest
Razvan	Arash	Delta Star Inc	Y
Rodriguez	Juan	Manetron	Guest

Robels	Antonio	Bureau of Reclaminion	Guest
Rossini	Yuri	Siemens Energy	Y
Rutledge	Chris	Gevernova	Guest
Saad	Mickel	Hitachi Energy	Y
Sanchez-Rodger	Jesus	Voltyx	Guest
Scaidazzi	Alaor	Siemens Energy	Guest
Shannon	Micheal	REA MAGNET WKS	Guest
Sarkar	Amitabh	Virginia Transformers	Y
Sbravti	Alen	Hitachienergy	Guest
Schott	Cody	The J-J Family of Camp	N
Schmitt	Wolfgang	Schneider Electric	Guest
Shaikh	Salahuddin	NGR	Guest
Shertukde	Emchrovdea	UHART	Guest
Singh	Amitkumar	ConEdision	Guest
Sinclair	John	Black and Veatch	Y
Simonov	Igor	Toronto Hydro	R
Smith	Jimmy	Howard Industries	Guest
Snyder	Jason	First Energy	Guest
Soeller	Markus	Power Diagnostix System	N
SOHN	Yong Tue	HYOSONG HICO	Y
Soto	Mauricio	Hitachi Energy	Y
Sparling	Brian	KINECTRICS	Y
Stauffer	Jonathan	BOR	Guest
Staley	Brad	Leeward Renewable Energy	Y
Steeves	Greg	Baron USA	Y
Sunny	Swarna	Virginia Transformer	Guest
Sweetser	Charles	Omicron	Guest
Witkowski	Michal	Hitachi Energy	Guest
Tanaka	Troy	Burns and McDonnell	Y
Thumpson	James	T&R Service	Guest
Teofanovic	Marko	Ontario Power Generation	Guest
Thierry	Juan Luis	Doble Engineering	Guest
Thomps	Jim	T&R Service Co.	R
Holifield	Thomas	Howard	Guest
Thomas	Prevost	Weidman	N
Thompson	Ryan	Burns and McDonnell	Y
Tillery	Tim	Howard Industries	Guest
Tostrud	Mark	Dynamic Ratings	Y
teNyenhuis	Ed	Hitachi Energy	Y
Trojrlo	Pedro	Hyundai	Guest
Van Drell	Cole	American Transmission Co	Y
Vanderwalt	Alwyn	ECI	Y
Verdolin	Rogerio	VERDOLIN Solutions	Y
Vir	Dharam	Prolec GE	Y
Volodymyr	Prykhodko	ZTZSETVECES	N
Vu	Nguyen	IFD Technologies	Guest
Wager	John	AEP	Guest
Washburn	Alan	Burns & McDonnell	Guest
Welton	Drew	Intellirent	Y
Watson	Joshua	NPPD	N
Weyer	Daniel	Monolith	Y
White	Elliot	SD Myers	N
Whitehead	Bill	H2Scan	Y
Whitesell	Kayla	Delta-X Research	Guest

Woods	Deanna	PTT LLC	Y
Wess	Zacan	Weg Trains	Guest
Wright	Jeffery	Duqlight	Guest
Xu	Shuzhen	FM Global	Y
Yeboah	Kwasi	GE Varnova	Guest
Yeh	Stanly	Shihlin Electric	Guest
Yuan	Grace Gung	Hitachi Energy	Guest
Yu	Zachary	Sieyuan Toshiba	Guest
Yu	Asam	Shihlin Electric	Guest
Zhn	zhinwring	Chint	Guest
Zhang	Hongzhi	Burns & McDonnell	Guest
Zuiderveen	Thomas	IFD Technologies	Guest
Stank	Markus	Reinhausen	Guest

Insulation Life Subcommittee

March 26, 2025

Denver, Colorado

Chair: Sam Sharpless

Vice-Chair: Jinesh Malde

Secretary: Anastasia O'Malley

The Insulation Life Subcommittee (ILSC) was called to order by the Chair on March 26, 2025, at 8:00 am MDST. The list of subcommittee members was displayed and attendees scanned a QR code to record their attendance. The Chair reviewed the agenda and introduced the subcommittee officers. Due to the size of the group, general introductions were not made. The Chair requested that each person state their name and affiliation when addressing the subcommittee.

H.1 Chair's Report/Remarks

The Chair emphasized the timely completion, technical accuracy, and usefulness of quality projects through the participation of working group leaders, subject matter experts and the general membership.

The Chair reviewed the requirement for activity leaders to maintain updated documents on the subcommittee webpage. He also reviewed administrative requirements for task force and working group chairs. The Chair showed the essential patent claim notice and requested that any person with knowledge of an essential patent that meets the requirements of any subcommittee standard to bring the issue forward for discussion. No essential patent claims were raised.

The Chair reviewed guidelines for IEEE working group meetings reminding compliance with all applicable laws, including antitrust and competition laws.

The Chair displayed the copyright policy and advised the subcommittee that permission would be required from the authors or organizations for use of information.

The Chair discussed the membership requirements and welcomed new members:

Juan Alfredo Carrizales Baaldua
Miguel Garcia
Carlos Gaytan
Miljenko Hrkac
Nick Jensen
Qasim Khan
Yeounsoo Kim
Junho Lee
Gabriel Mamede
Cole Van Dreel
Bruce Webb
Joe White
Terry Wong
Fei Yang

And reviewed members moved to guest status:

George Frimpong
Kurt Kainerder
Chao Li
Jose Luis Machain
Kent Miller
Jaber Shalabi
YoungTae Sohn
Mauricio Soto
William Whitehead

H.2 Secretary's Report

For the Spring 2025 Denver meeting, a QR scan code was used for attendance polling and recording. The QR code scan indicated that a quorum had been achieved with 106 out of 131 members in attendance. The QR code scan indicated that 134 guests were also present. Participants requesting membership for the subcommittee were advised to reach out to the Chair, Vice-Chair or Secretary at the conference or through email, or to note it during the QR code scanning. Thirty-seven guests requested membership. A list of attendees is provided at the end of this report.

The Fall 2024 subcommittee meeting minutes had been provided to participants in advance of the meeting for review.

Sami Debass made a motion to approve the minutes. Eduardo Garcia Wild seconded the motion. After hearing no objection from the attendees, the Fall 2024 meeting minutes were approved by unanimous consent.

The agenda for the meeting had been provided to participants in advance of the meeting for review. An updated agenda with one order change highlighted was displayed.

Marcos Ferreira moved for approval of the agenda as shown. Amitabh Sarkar seconded the approval of the agenda. After hearing no objection from the attendees, the meeting agenda was approved by unanimous consent.

H.3 Technical Activity Reports

H.3.1 WG IEEE 1276a IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid Immersed Distribution, Power and Regulating Transformers, Annex B and D revision – Kevin Biggie WG Chair presented update

This working group did not meet in person during the Spring meeting as the document is in the balloting process. On January 25, the document proceeded to the IEEE Standards Association to initiate ballot approval. The ballot pool was closed resolving 120 comments. The document is awaiting Mandatory Editorial Coordination review. The document will incorporate MEC changes and then proceed to final ballot.

H.3.2 C57.119 Study Group - Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings – Ewald Schweiger Chair presented the update

The study group had developed a title, scope and purpose that was approved and submitted to NESCOM. The PAR is on this week's NESCOM meeting agenda and pending formal approval of the PAR. Members are currently reviewing the existing document in preparation of the Fall Committee meeting to provide feedback whether updates are needed. The unapproved meeting minutes from the Spring 2025 study group meeting are directly below. These minutes are followed by the approved Fall 2024 meeting minutes.

Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings

- 1) Meeting took place at 9:30 AM (CDT) on Monday March 24th, 2025
- 2) In our todays in person meeting 72 attended our in person meeting.
 - o Attendance: 72
 - o Members: 9
 - o Guests: 63
- 3) A brief overview about the previous meetings of C57.119 was presented:
 - o F23 - Kansas City: Start Study Group for C57.119.
 - o S24 – Vancouver: Recommendation to ILSC “Document needs revision” and received task to work on title / scope.
 - o Sept 24 - Virtual: Voted on wording of title and scope.
 - o F24 – St Louis: ILSC’s approval to create a PAR to revise the document.
 - o S25 – NesCOM Meeting March 26th 2025: Agenda 4.5.10.
The current status on MyProject showed that 16 have pre-voted to accept our PAR – 2 votes are pending.
→ Need to wait for the official communication from NesCOM.
 - o Purpose of this meeting is to work on the needs for revision, improvements and adaptations.
- 4) Call for patents, Copyright statement, Participant behavior
 - a) The slides on essential patents from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.
→ No essential patents or issues were reported.
 - b) The slides on IEEE copyright policy from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.
→ No issues were reported.
 - c) The slides on “Participant behavior in IEEE-SA activities is guided by the IEEE Codes of Ethics & Conduct” have been presented.
- 5) Establish quorum
 - o A quorum was achieved.
Total number of members is 11, requiring 6 members for quorum.
9 members have been present in the meeting.
→ Quorum achieved.
- 6) Approval of agenda

- a) No comments from the group.
 - b) The agenda was unanimously approved (1st motion by Samuel Sharpless and 2nd Juan Castellanos).
- 7) Approval of meeting minutes of the previous in-person meeting from October 28th, 2024.
- a) No comments from the group.
 - b) The meeting minutes were unanimously approved (1st motion by Juan Castellanos and 2nd Alfons Schrammel).
- 8) If NesCOM will approve our PAR, this was the last meeting as Study Group.
- In order to be pro-active we continued the discussion based on feedback from review of C57.119 and next steps with the focus to work on the needs for revision, improvements and adaptations.

- a) The actual Title, Scope, Need and Purpose submitted in the PAR was presented:

Title (for PAR 2024):

IEEE Recommended Practice for determining the thermal parameters of liquid immersed power transformers.

Scope (for PAR 2024):

This recommended practice covers test procedures for determining the thermal parameters of liquid immersed power transformers needed to appraise the transformer's load carrying capabilities.

Need (for PAR 2024):

This revision is needed to maintain and provide necessary updates and corrections to this recommended practice in order to reflect today's technology.

Purpose (for PAR 2024):

These recommended test procedures for performing temperature rise tests on power transformers are for the purpose of the following:

- a) Determining the thermal characteristics of a transformer needed to appraise the thermal performance of a transformer at loads other than nameplate rating.
 - b) Verifying that a transformer can be loaded with a specified load profile without exceeding specified temperature rise.
 - c) Assessing a transformer's performance during transient loading, simulating a load cycle that includes loads in excess of nameplate rating.
- b) The content of C57.119 – 2028 was shown and the group was asked to volunteer to review and work on suggestions about the needs for revision, improvements and adaptations.
- Here is the list of the content and the individuals who took the task to review and present the outcome in the next meeting.

Last Name	First Name	Clause	Last Name	First Name	Clause
Bhattiprolu	Prudhvi Anand	Annex A-D	Ortiz	Quauhtemoc	9
Calil	Wilerson	3, 4	Palhatiya	Ajay	7
Castellanos	Juan	9,10, 11	Patel	Monil	5, 6
Cisco Sullberg	Adriana	5, Annex A-D	Poulin	Bertrand	8, 9, 10, 11
Diaconu	Dumitru	9	Stechschulte	Kyle	3, 4, 6, 7
Hoffman	Saramma	6, 7	Tan	Jonathan	9
Kumar	Arvind	10	Vedantham	Aparna	5
Mamede	Gabriel	9, 10,11			

Volunteer	Clause	Content of C57.119 - 2018
	1	Overview
	1.1	Scope
	1.2	Purpose
	2	Normative references
Wilerson Calil Kyle Stechschulte	3	Definitions, symbols, and subscripts
	3.1	Definitions
	3.2	Symbols
	3.3	Subscripts
Wilerson Calil Kyle Stechschulte	4	General
	4.1	Preliminary evaluation
	4.2	Cooling equipment operation
Monil Patel Adriana Cisco Sullberg Aparna Vedantham	5	Precautions
	5.1	Thermal degradation
	5.2	Other factors limiting loading
	5.3	Monitoring of test results
	5.4	Maximum temperatures
Saramma Hoffman Monil Patel Kyle Stechschulte	6	Monitored data
	6.1	Ambient air temperature
	6.2	Insulating liquid temperatures
	6.3	Other temperatures
	6.4	Currents
Saramma Hoffman Ajay Palhatiya Kyle Stechschulte	7	Recorded data
	7.1	Losses
	7.2	Temperature indicator readings
	7.3	Tank surface and other temperatures
	7.4	Insulating liquid levels
Bertrand Poulin	8	Insulating liquid samples
Juan Castellanos Dimitru Diaconu Gabriel Mamede Cuauhtemoc Ortiz Bertrand Poulin Jonathan Tan	9	Test procedure for determining the thermal characteristics of liquid-immersed power transformers
	9.1	Tap position and connection
	9.2	Number of tests
	9.3	Applied test currents
	9.4	Discontinued tests
	9.5	Temperature rise test at rated load
	9.6	Temperature rise test at reduced load
	9.7	Temperature rise test at load beyond nameplate rating
	9.8	Evaluation of thermal data
	9.9	Evaluation of other data
Juan Castellanos Gabriel Mamede Arvind Kumar Bertrand Poulin	10	Test procedure for performing load cycle temperature rise tests
	10.1	Recommended prior tests
	10.2	Information specified by user
	10.3	Determination of load cycle
	10.4	Preparatory calculations
	10.5	Data recorded
	10.6	Test procedure
	10.7	Interrupted test
	10.8	Assessment of transformer performance
Juan Castellanos Gabriel Mamede Bertrand Poulin	11	Integrated test procedures for determining thermal characteristics and for performing load cycle temperature rise tests
	11.1	Load cycle simulation
	11.2	Preliminary evaluation
	11.3	Test procedure
	11.4	Initial test
	11.5	Conditioning load
	11.6	Beyond maximum nameplate test
	11.7	Final test
Prudhvi Anand Bhattiprolu Adriana Cisco Sullberg	Annex A	(normative) Loading guide equations
Prudhvi Anand Bhattiprolu Adriana Cisco Sullberg	Annex B	(informative) Tutorial .
Prudhvi Anand Bhattiprolu Adriana Cisco Sullberg	Annex C	(informative) Hottest spot measurements using direct reading fiber optics temperature measurements
Prudhvi Anand Bhattiprolu Adriana Cisco Sullberg	Annex D	(informative) Bibliography .

- c) The meeting progressed with a deeper conversation to determine which supplementary topics should be considered and what are the cornerstones to follow.

- Sanjay Patel raised the issue of potentially incorporating Dissolved Gas Analysis (DGA) Limits into the revision. There is an apparent need for clarity on this matter, particularly in relation to avoiding redundancy with existing documentation, such as standard C57.130 and various CIGRE publications.

In response to this need, [Sanjay Patel has kindly offered to prepare a detailed problem statement](#). This document will serve as a basis for more focused discussions in our upcoming meetings, allowing us to address this matter with the thoroughness it requires.

9) New business:

Joe Watson's insights on the **Overload Test** were shared on his behalf, as he was unable to attend due to a scheduling conflict with a session he was chairing.

Thoughts on Overload Test

Summary of input from Joe Watson

- **Overload Tests Overview:**
 - Specified as percentages of the nameplate rating.
 - Many users specify both Winter and Summer, short- & long-term overloads.
 - Include pre-overload loading conditions.
- **Overload Percentages:**
 - Short-term overloads: Higher percentage than long-term.
 - Winter overloads: Higher percentage than Summer.
- **Winter Overloads (short and long term):**
 - Specified at lower ambient temperatures than manufacturers' test labs.
 - Testing Winter overloads at Summer ambient temperatures likely to be subjected to winding and top oil total (rise plus ambient) temperatures that are significantly greater than its specified or designed performance characteristics, and the transformer could be damaged (rise plus ambient)
- **Summer Overloads :**
 - Should be able to be tested with minimal loss of insulation life.
- **Best Practices:**
 - Perform overload temperature rise tests in Summer long-term conditions.
 - Measure hot resistance only on the hottest phase, as determined on the ONAF2 temperature rise tests.
 - Re-energize transformer if all required hot resistances cannot be measured during the first shutdown.
- **Challenges:**
 - Temperatures at the end of overloads are likely increasing and not stabilized.
 - Reheating transformer to stable pre-load temperature for long-term overload tests is impractical.
- **Future Considerations:**
 - Discuss best practices for addressing overload testing challenges.
 - Reheat time should bring top oil temperature back to the temperature at the first shutdown ... but the group may have a better solution.
 - The whole reheating process for the 2nd or third shutdown can have more effect on the measured temperatures than the transformer's thermal performance.

10) The meeting was adjourned at 10:30 AM (MDT)

11) Next meetings (planned):

If NesCOM approves our PAR in their meeting on March 26th then we will meet the first time as a WG.

- Virtual meeting – might be scheduled before October 2025.
- In-person meeting F25 – October 19-23, 2025 in Bonita Springs, FL.

Respectfully submitted,
Ewald Schweiger
Study Group Chair

List of attendees for this meeting:

Last name	Given name	Affiliation	Status
Abdalla	Isaac	HICO America	G
Antosz	Stephen	Consultant	M
Avanoma	Onome	MJ Consulting	G
Berube	Jean-Noel	Rugged Monitoring Quebec Inc	G
Bhattiprolu	Prudhvi Anand	AES	G
Blaydon	Daniel	Baltimore Gas and Electric	G
Bradshaw	Garrett	Howard Industries, Inc.	G
Brekalo	Josipa	Koncar D&ST	G
Bule	John	DTE Energy	G
Calil	Wilerson	Member, Hitachi Energy	G
Carrizales	Alfredo	Prolec GE	G
Castellanos	Juan	Prolec GE	M
Cisco Sullberg	Adriana	Salt River Project	G
Diaconu	Dumitru	Delta Star Inc	G
Digby	Scott	Duke Energy	G
Dillon	Nikolaus	Dominion Energy	G
Elson	Eric	San Diego Gas and Electric	G
Espitia	Egui	Reinhausen Manufacturing Inc	G
Farmer	James	Bureau of Reclamation	G
Frazier	Raymond	Ameren	G
Greaves	Brad	Weidmann Electrical Technology, Inc	G
Hampton	Kevin	Siemens Energy	G
Heinzig	Peter	Weidmann Electrical	G
Hoffman	Saramma	PPL	M
Holifield	Thomas	Howard Industries Inc	G
Jensen	Nick	Delta Star	G
Jeong	Chanmin	HD Hyundai	G
Khan	Qasim	NEETRAC-Georgia Tech	G
Kim	Yeounsoo	JST power equipment	G
Kiparizoski	Zan	Howard Industries	G
Klempner	Dmitriy	Guest	G
Koprivnjak	Matija	Končar D&ST	G

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Kumar	Arvind	Delta star inc	G
Leal	Fernando	PROLEC ge	G
Mamede	Gabriel	Siemens Energy	M
Markus	Schiessl	SGB	G
Martínez Mares	Alberto	WEG USA	G
McBride	Brian	Cargill	G
Munoz	Marta	Hitachi Energy	G
Natale	Anthony	HICO America	G
Norton	James	Oncor	G
OMalley	Anastasia	Consolidated Edison Co NY	G
Ortiz	Cuauhtemoc	Niagara Power Transformer Corp.	G
Palhatiya	Ajay	Virginia Transformer	G
Park	Dean	Hyosung Hico	G
Patel	Monil	Pacific Gas and Electric	G
Patel	Sanjay	Royal Smit Transformers	G
Pellon	Verena	FPL and NextEra	G
Perez	Marcelino	PROLEC	G
Poulin	Bertrand	Hitachi energy	M
Reyes perez	juan	Hitachi energy	G
Ronchi	Rodrigo	WEG Transformers México	M
Sanche Rodriguez	Jesus	Vertiv	G
Sankarakurup	Dinesh	Duke Energy	G
Santos	Armindo	PROLEC GE	G
Schrammel	Alfons	Siemens-Energy	M
Schweiger	Ewald	Siemens Energy	M / Chair
Sharpless	Samuel	Rimkus	M / Chair ILSC
Shawn	Gossett	Ameren Illinois	G
Skeik	Ahmad	Crosslink Technology Inc.	G
Stauffer	Jonathon	Bureau of Reclamation	G
Stechschulte	Kyle	AEP	G
Tan	Jonathan	Northern Transformer	G
Thomas	Scott	Hitachi Energy	G
Tolcachir	Eduardo	TTE transformers	G
Van Dreel	Cole	American Transmission Co.	G
Varghese	Ajith	Prolec GE Waukesha	G
Varnell	Jason	Doble Engineering	G
Vedantham	Aparna	Virginia Transformer	G
Weisensee	Matthew	PacifiCorp	G
White	Joe	POWER Engineers	G
Zibert	Kris	Allgeier Martin	G

Approved C57.119 Study Group Fall 2024 Meeting Minutes
Chair: Ewald Schweiger

**Recommended Practice for Performing Temperature Rise Tests on
Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings**

- 1) Meeting took place at 9:30 AM (CDT) on Monday October 28th, 2024
- 2) After the virtual meeting on September 29th, 2024, this was the second in person meeting after Vancouver S24 In our todays in person meeting 81 attended our second in person meeting.
 - o Attendance: 81
 - o Members: 7
 - o Guests: 74
- 3) A brief overview about the previous meetings of C57.119 was presented:
 - o F23 - Kansas City: Start Study Group for C57.119
 - o S24 – Vancouver: Recommendation to ILSC “Document needs revision” and received task to work on title / scope.
 - o Sept 24 - Virtual: Voted on wording of title and scope
 - o F24 – St Louis: Seek ILSC’s approval to create a PAR to revise the document. Make motion on Wednesday
 - o Purpose of this meeting is to work on the purpose with the objective to complete the content needed for the PAR
- 4) Call for patents & Copyright statement
The slides on essential patents from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.
 - No essential patents or issues were reported.
 - a) The slides on IEEE copyright policy from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.
 - No issues were reported.
- 5) Establish quorum
 - o A quorum was achieved
Total number of members is 11 requiring 6= members for quorum.
7 members have been present in the meeting
- 6) Approval of agenda
 - a) No comments from the group
 - b) The agenda was unanimously approved (1st motion by Juan Castellanos and 2nd Bertrand Poulin)
- 7) Approval of meeting minutes of the previous virtual meeting from September 29th, 2024
 - a) No comments from the group
 - b) The meeting minutes were unanimously approved (1st motion by Bertrand Poulin and 2nd Juan Castellanos)
- 8) Discussion based on feedback from review of C57.119 and next steps needed for the new PAR

The main purpose of this meeting is to work on the purpose of C57.119 and continue to identify needs for improvements / changes

- a) The discussions which took place, covered topics, like need to cover DGA, test procedure and overlapping with C57.12.90 and C57.12.91
- b) Based on the discussions and decision from the previous meeting the following wording was presented:

Title (for PAR 2024):

IEEE Recommended Practice for determining the thermal parameters of liquid immersed power transformers

Scope (for PAR 2024):

This recommended practice covers test procedures for determining the thermal parameters of liquid immersed power transformers needed to appraise the transformer's load carrying capabilities.

Need (for PAR 2024):

This revision is needed to maintain and provide necessary updates and corrections to this recommended practice in order to reflect today's technology.

- c) Per the decisions made in the last virtual meeting the SG chair will seek approval from the ILSC on Wednesday, October 30th, 2024 at the F24 meeting in St. Louis, MO to use the above mentioned (8b) wording of the title and scope for creation of the PAR to revise C57.119.
- d) In regards to the question from the last virtual meeting about the a purpose statement in the document, it was recommended by IEEE to include in the purpose statement in the PAR in order to be included in the "standard document". Otherwise a PAR modification needs to be applied for.
Therefore the group decided to move forward to discuss the wording of the purpose statement

- e) The current wording of the "purpose" in the PAR from 2014 were presented

Purpose (Old PAR 2014):

These recommended test procedures for performing temperature rise tests on power transformers are for the purpose of the following:

- a) *Determining the thermal characteristics of a transformer needed to appraise the thermal performance of a transformer at loads other than nameplate rating*
- b) *Verifying that a transformer can be loaded with a specified load profile without exceeding specified temperature rise*
- c) *Assessing a transformer's performance during transient loading, simulating a load cycle that includes loads in excess of nameplate rating*

Tests performed in accordance with Clause 9 are for the purpose of determining transformer thermal characteristics in a consistent manner. Data may then be accumulated from a large number of transformers and used to evaluate the accuracy of the equations and the empirical constants used in the loading guides.

Tests performed in accordance with Clause 10 are for the purpose of demonstrating the thermal effects of loading a transformer with a specified sequence of loads, including loads beyond nameplate rating.

Tests performed in accordance with Clause 11 are for the combined purposes of determining the thermal characteristics of a transformer and demonstrating the thermal effects of loading with a designated load cycle. This is accomplished by performing temperature rise tests at three loads, similar to Clause 9, except the three loads are selected to simulate the thermal effects of a specific load cycle.

It is not intended that all of these procedures be performed on a transformer design. It is intended that only one of the following combinations of test procedures be specified:

- Clause 9 only, when thermal characteristics are to be determined*
- Clause 10 only, when only verification of complying with temperature limits when loaded to a specific load profile is needed*
- Clause 9 plus Clause 10, when both thermal characteristics and verification of compliance with temperature limits when loaded to a specific load profile are needed*
- Clause 11 when both thermal characteristics and verification of compliance with temperature limits when loaded to a specific load profile are required, and the load profile can be represented with three steady state loads*

The user should specify which of the test procedures are required at the time of specification.

A further purpose of these procedures is to obtain information with respect to possible loading limitations imposed on the transformer by liquid levels and ancillary equipment when the transformer is operated at loads beyond nameplate rating.

- f) Extensive discussions for the wording of the purpose took place, like the content and the details needed and how possible changes in the numbering within the new document will impact the wording.
- g) The final conclusion was to keep the wording simple and more general. With all further details then put into other sections, like introduction and others
- h) Ryan Hogg suggested to shorten the wording and keep just the beginning and the delete the rest.

The proposal of the wording read as follows and was shown on the screen:

Purpose (for PAR 2024):

These recommended test procedures for performing temperature rise tests on power transformers are for the purpose of the following:

- a) Determining the thermal characteristics of a transformer needed to appraise the thermal performance of a transformer at loads other than nameplate rating
 - b) Verifying that a transformer can be loaded with a specified load profile without exceeding specified temperature rise
 - c) Assessing a transformer's performance during transient loading, simulating a load cycle that includes loads in excess of nameplate rating
- i) Bertrand Poulin made the motion to use this wording as stated above in e) and which was shown on the screen to use for the purpose statement for the application of the PAR if the ILSC will approve the creation of the PAR in SC meeting on the following Wednesday. Juan Castellanos provided second.
 - o Motion was carried unanimously with no objections or abstentions.

- j) The ILSC Chair Samuel Sharpless took the opportunity to express his appreciation to the group to take this task forward and thanked for the established results.
- 9) Based on this, we will seek approval from the ILSC on Wednesday, October 30th, 2024 at the F24 meeting in St. Louis, MO to request a PAR to revise C57.119
- 10) The meeting was adjourned at 10:30 AM (CDT)
- 11) Next meetings (planned):
- Virtual meeting – might be scheduled before March 2025
 - In-person meeting S25 – March 23-27, 2025 in Denver, CO

Respectfully submitted,
 Ewald Schweiger
 Study Group Chair

List of attendees for this meeting:

Last name	Given name	Affiliation	Status
Adams	Kayland	Prolec Ge Waukesha	G
Arnold	Elise	SGB	G
Bargone	Gilles	FISO	G
Blaydon	Daniel	Baltimore Gas and Electric	G
Bohrn	Josh	PacifiCorp	G
Bradshaw	Garrett	Howard Industries	G
Calil	Wilerson	Hitachi Energy	G
Carrizales	Alfredo	PROLEC	G
Castellanos	Juan	Prolec GE	M
Cisco Sullberg	Adriana	Salt River Project	G
Craven	Michael	Qualus	G
Crockett	Dan	Ameren	G
Dappen	Tim	CARGILL	G
Davoudi	Ponneh	Delta Star	G
Digby	Scott	Duke Energy	G
Dillon	Nikolaus	Dominion Energy	G
Dolloff	Paul	East Kentucky Power Cooperative	G
Dorpmanns	Luc	Royal SMIT Transformers	G
Dzodan	Janko	Končar D&ST	G
Eduardo	Tolcachir	TTE Transformers	G
Elson	Eric	San Diego Gas and Electric	G
Frazier	Raymond	Ameren	G
Frye	Richard	Eaton	G
Gasic	Dragana	KONCAR D&ST	G
Greaves	Brad	WEIDMANN Electrical Technology	G
Hoffman	Saramma	PPL	M
Hogg	Ryan	Bureau of Reclamation	G
Holifield	Thomas	Howard Industries	G
Hussain	MD Rashid	Mississippi State University	G

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Jensen	Nick	Delta Star	G
Kaineder	Kurt	Trench Austria	G
Katapalli	Thrinadha	Virginia transformer corporation	G
Khan	clasim	NEETRAC - Georgia Tech	G
Kim	Yeounsoo	Meppi	G
Kiparizoski	Zan	Howard Industries	G
Kumar	Arvind	Delta Star Inc	G
Lachman	Mark	Foble	G
Lembacher	Stefan	Siemens Energy	G
Mamede	Gabriel	Siemens Energy	M
Martinez Mares	Alberto	WEG Transformers USA	G
McBride	Brian	Cargill	G
Munoz	Marta	Hitachi Energy	G
Natale	Anthony	HICO America	G
Newbill	Mark	Hitachi	G
Omalley	Anastasia	Con Edison NY	G
Orozco	Eduardo	GE Grid Solutions	G
Park	Dean	Hyosung Hico	G
Patel	Sanjay	SGB-Smit USA	G
Pavicic	Tomislav	Koncar Power Transformers Ltd	G
Poulin	Bertrand	Hitachi Energy	M
Reyes perez	Juan	Hitachi Energy	G
Richardson	Michael	Ameren	G
Ronchi	Rodrigo	WEG Transformer Mexico	G
Sahin	Hakan	Virginia transformer corp	G
Sankarakurup	Dinesh	Duke Energy	G
Sarkinen	Garret	Xcel Energy	G
Schiessl	Markus	SGB	G
Schrammel	Alfons	Siemens Energy	M
Schweiger	Ewald	Siemens Energy	M / Chair
Sen	Cihangir	Duke Energy	G
Shaikh	AbdulMajid	Delta Star Inc.	G
Sharpless	Samuel	Rimkus	M / Chair ILSC
Stechschulte	Kyle	American Electric Power	G
Steineman	Andrew	Delta Star, Inc.	G
Tan	Jonathan	Northern Transformer	G
Tanaka	Troy	Burns & McDonnell	G
Tekle	Samuel	WEG Transformers USA	G
Thomas	Scott	Hitachi Energy	G
Topol	Fran	Koncar Power Transformers Ltd.	G
Tostrud	Mark	Dynamic Ratings	G
Vanderwalt	Alwyn	Electrical Consultants Inc	G
Varghese	Ajith	Prolec Ge Waukesha	G
Varnell	Jason	Doble Engineering	G
Varnell	Jason	Doble Engineering	G
Viy	Dharam	Prolec Ge Waukesha	G

Wagner	John	American Electric Power	G
Watson	Joshua	NPPD	G
White	Joe	Power Engineers	G
ZHENQUAN	YU	Sieyuan Toshiba	G
Zibert	Kris	Allgeier Martin & Associates	G
Ziger	Igor	Končar - Instrument Transformers	G

H.3.3 WG C57.91 Guide for Loading Mineral-Oil-Immersed Transformers – David Wallach, WG Chair presented the update

Chair: David Wallach
Vice-Chair: Javier Arteaga
Secretary: Kumar Mani

The working group did not meet during the Denver Spring meeting. The ballot successfully closed on February 15, 2024, with 448 comments to be resolved. The comment resolution group completed resolving the comments and the document has been updated. The document will begin recirculating for balloting next week. The document is on track to be completed by the end of the year before the PAR expires on December 31, 2025.

H.3.4 C57.162 Guide for the Interpretation of Moisture Related Parameters in Liquid Immersed Transformers and Reactors – Tom Prevost, WG Chair presented the update

Chair: Tom Prevost
Secretary: Deanna Woods

No meeting was held in Denver. The comment resolution group resolved over 800 comments from the first recirculation. The second ballot recirculation yielded seven comments which have been resolved. The recirculation is scheduled to begin in the next month. The plan is to submit the document to IEEE SA Review Committee in June and the document should be approved by the fall. The PAR has been extended to December 31, 2025.

H.3.5 C57.165 IEEE Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors – Mark Tostrud WG Chair presented the update

No meeting was held in Denver. The updated document was published at the end of February.

H.3.6 Task Force C57.12.90 Clause 11, Temperature Rise Tests – Dinesh Sankarakurup, TF Chair presented the meeting minutes from the March 25th meeting during which the addition of two sections was finalized.

ILFC TF Continuous Revisions to IEEE C57.12.90 Clause 11

Temperature-rise Tests

March 25th, 2025, Denver, CO

TF - Temperature-rise Tests		
Chair: Dinesh Sankarakurup	Vice-Chair: Ajith M. Varghese	Secretary: Cihangir John Sen
Room: Centennial F	Date: March 25 th , 2025	Time: 3:15 pm to 4:30 pm
Total TF Members: 30	Members present at the Quorum: 19	Attendance Per Roster: 53
Guests present: 30 (Table-2)	Membership requested: 12	Granted membership: 4
Status changed to Guest: 5		Final TF Members: 29 (Table-1)

Chair's Remarks

The meeting was called to order at 3:15 PM on March 25, 2025. The Chair welcomed members and guests to the Spring 2025 meeting.

Attendance rosters were circulated. There were 52 participants present (including the Chair, Vice Chair, and the Secretary) and 12 participants requested voting membership. Six (4) of the 12 requests were granted according to their participation records. 5 members' statuses have changed to guest.

Per the Working Group Policies and Procedures, voting membership status will be effective as of the start of the next meeting in Fall 2025. Table 1 is the final list of the **29 members** of the TF. Table 2 lists the 31 guests present at the Fall 2024 meeting.

Table-1: Final Membership List (after F24 Meeting)

	First Name	Last Name		First Name	Last Name
1	Steve	Antosz (P)	16	Bertrand	Poulin (P)
2	Michael	Botti (New) (P)	17	Juan	Reyes Perez
3	Juan	Castellanos (P)	18	Dinesh	Sankarakurup (P)
4	Luc	Dorpmanns (P)	19	Garret	Sarkinen (New) (P)
5	Hakim	Dulac (New) (P)	20	Cihangir John	Sen (P)
6	Renjie	Fu	21	Abdulmajid	Shaikh
7	Saramma	Hoffman (P)	22	Michael	Shannon (P)
8	Qasim	Khan (P)	23	Sam	Sharpless (P)
9	Zan	Kiparizoski (P)	24	Sanjib	Som (P)
10	Egon	Kirchenmayer (P)	25	Valeriu	Tatu (P)
11	Arvind	Kumar (New) (P)	26	Ryan	Thomson
12	Fernando	Leal (P)	27	Ajith	Varghese (P)

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13	Gabriel	Mamede (P)	28	Jason	Varnell (P)
14	Francis	Mills	29	David	Wallach (P)
15	Marta	Munoz			

(P) Members Present, (New) New Member

Table-2: Guests present during S25 WG Meeting

	First Name	Last Name		First Name	Last Name
1	Kayland	Adams	16	Kris	Neild
2	Mario	Alonzo	17	James	Norton
3	Elise	Arnold	18	Ajay	Palhatiya
4	Darren	Brown	19	Dwight	Parkinson
5	Vivian	Chan	20	Crystal	Qiao
6	Dimitri	Diaconu	21	Layman	Rapelly
7	Curtis	Frazier	22	Hyounggon	Ryu
8	Alireza	Gorzin	23	Armino	Santos
9	Vijay	Gunja	24	Amitkumar	Singh
10	Chanmin	Jeong	25	Ahmad	Skeik
11	Lalchami	Komel	26	Andreas	Thiede
12	Nihat	Kosedag	27	Scott	Thomas
13	Luc	Loisellez	28	Pedro	Truillo
14	Moses	Manzano	29	Yves	Vermette
15	Alberto	Martinez Mares	30	Leon	White

Quorum, Approval of Minutes and Agenda

At the time of quorum 18 of the 30 members were present so quorum was achieved short after the meeting start. The Unapproved minutes from the Fall 2024 in St Louis meeting was presented by Chair and approved by the WG.

Below members' statuses have changed to Guest due to their attendances.

Members changed Guest Status	
First Name	Last Name
Gilles	Bargone
William	Boettger
Samraghi	Dutta Roy
Jarrold	Prince
Ewald	Schweiger

The agenda for the Spring 2025 meeting minutes were unanimously approved.

Patents and Copyrights

Chair made the call for the patent and shared the IEEE SA slides on patent policy and copyright. The attendees were asked if there were any Patents and Copyrights relevant to the scope that the TF should be aware of. None were reported.

TF started to discuss about the old businesses since quorum was achieved.

Old/ Unfinished Businesses:

1) Hot spot rise calculation for OFAF /OFWF cooler transformer

Chair presented the survey results for the proposed changes by Bertrand Poulin regarding the section that was implemented from the C57.119-2018. This section is about the top oil temperature location for OFAF and OFWF compared to ONAN and ONAF cooling methods.

Chair suggested to survey the revised clause 11.3.2 within the Task Force after implementing the all the changes discussed during the Fall 2024.

This section has already been circulated within the TF to collect comments and was sent out for a final survey within the task force.

Survey results received with 91% approval (23 responded, 21 approved, 2 abstain). Two editorial comments were also review and accepted by the task force.

Chair shared the two comments from the participants. Both were editorial comments and already addressed in the revised version.

Chair asked for motion to Chair asked for motion to include two sections –

11.3.2.1 Basic transformer thermal model: This section brings relevant information from C57.119, updated with recommended edits based on TF surveys and discussions to explain basic transformer thermal model and differences between cooling modes.
and

11.3.4 Determination of winding hottest spot temperature-rise in the C57.12.90:
C57.12.00 specifies a limit for winding hot spot, but no method is suggested to calculate it. This section brings relevant information from C57.119, updated with recommended edits based on TF surveys and discussions.

The motion was unanimously approved and TF agreed to include the sections in the next C57.12.90 revision.

TF recommends ILSC the addition of above two sections 11.3.2.1 and 11.3.4 to C57.12.90 as finalized during the S25 TF meeting held on 3/25/2025.

2) Negative Altitude Correction (Transformers tested at factories located > 1000 m)

TF also reviewed the survey results for the reverse altitude correction formula under Sub clause 11.4.3, “**Correction of liquid temperature rises for differences in altitude**” survey results were received with 29 approved and 1 abstain from 30 responders.

Original version of the section 11.4.3 refers adjusting the oil rise when a transformer is tested at 1000 m or less and is to be operated at a higher altitude. However, it does not specify making adjustments when the opposite situation applies, such as when a transformer is tested above 1000 m and is to be operated at 1000 m or less

Chair shared the two comments, that were answered within the WG without any change in the surveyed document.

Chair asked for motion to move forward with the revised altitude correction calculation section (Zan Kiparizoski, Sanjib Som). Motion was unanimously approved and TF agreed to include that section as is in the upcoming C57.12.90.

TF recommends ILSC adoption of the revised section 11.4.3 to C57.12.90 as finalized during the S25 TF meeting held on 3/25/2025.

3) Tap Selection for Temp Rise Test:

This section was already surveyed but the TF didn't have the chance to review the survey results in the last two meetings Spring 24 and Fall 24.

Vice Chair presented the survey results for the sections 11.1.2.1 and 11.1.2.2 for the tap selection during the temperature rise test. According to the survey results, there were 49 approved and 2 disapproved votes received. There were 16 comments that have already been incorporated in the final revision of the document; however, the two comments remain disapproved. Vice Chair made a motion to resurvey the clean copy of the section including the comments & responses (Sanjib Som, Juan Castellanos).

4) Hotspot measurement using fiber optics as an alternate method

This subject was proposed by Egon Kirchenmayer as an alternative winding temperature rise calculation by using the direct hot spot measurement with fiber optic probes in the winding that allows a reverse calculation of the average winding temperature rise.

TF discussed about the proposed method

Bertrand Poulin asked "if the method was compared with the traditional measurement of the winding temperature rise with the conventional hot resistance measurement. It was requested from the subgroup to present the results from conventional vs direct measurement methods."

Ajith Varghese mentioned that "the fiber optic probe measurements could have 5-10degC differences based on the location and each manufacturer might have different results based on the different insulation, location or installation practices. Therefore, the industry is not ready to implement the method."

Motion is to collect the requested data for the comparison of the direct measurement and conventional measurements. Chair requested volunteers from the manufacturers to provide data before the next meeting. It was clarified that the data should include the raw measurements from each fiber optic probe, not just the highest temperature value.

No new business was identified.

Meeting was adjourned at 4:30pm.

Minutes respectfully submitted by

Cihangir John Sen
Secretary

Dinesh Sankarup made a motion to add sections 11.3.2.1 and 11.3.4 to C57.12.90 as finalized during the Spring 2025 Task Force meeting that was held on March 25, 2025 and as shown below. Joe White seconded the motion. There was no objection to the unanimous approval of the motion.

11.3.2.1 Basic transformer thermal model

(This section brings relevant information from C57.119, updated with recommended edits based on TF surveys and discussions to explain basic transformer thermal model and differences between cooling modes.)

11.3.4 Determination of winding hottest spot temperature-rise

(C57.12.00 specifies a limit for winding hot spot, but no method is suggested to calculate it. This section brings relevant information from C57.119, updated with recommended edits based on TF surveys and discussions.)

Dinesh Sankarup made a motion to adopt the revised sections 11.4.3 to C57.12.90 as finalized during the Spring 2025 Task Force meeting that was held on March 25, 2025 and as shown below. John John seconded the motion. There was no objection to the unanimous approval of the motion.

11.4.3 Correction of liquid temperature rises for differences in altitude

(Original version says to make an adjustment to oil rise when a transformer is tested at 1000 m or less and is to be operated at a higher altitude. But it does not say to make an adjustment when the opposite situation applies, such as when a transformer is tested above 1000 m and is to be operated at 1000 m or less. The proposed changes provide an equation that can be used in both directions at specified altitudes.)

11.4.3 Correction of liquid temperature rise for differences in altitude

When factory tests are made at an altitude of 1000 m (3300 ft) or less, and the transformer is to be operated at an altitude of 1000 m (3300 ft) or less, then no altitude correction shall be applied to the liquid temperature rise.

When factory tests are made at one altitude and the transformer is to be operated at a different altitude, then it shall be assumed that the liquid temperature rise will change in accordance with Equation (32).

This equation applies in both directions, i.e.:

- When a transformer is tested at an altitude of 1000 m (3300 ft) or less, and it will operate at a site that is above 1000 m (3300 ft), then the correction will increase the tested (observed) liquid temperature rise.
- When a transformer is tested at an altitude above 1000 m (3300 ft), and it will operate at a site that is 1000 m (3300 ft) or less, then the correction will decrease the tested (observed) liquid temperature rise.

$$\Delta\theta_A = \Delta\theta_o \left(\frac{A_{site} - A_{test}}{A_o} \right) F \quad (32)$$

where

- $\Delta\theta_A$ is the correction of the liquid temperature rise (°C) from the altitude at test to the altitude at site, positive to increase or negative to decrease
- $\Delta\theta_o$ is the observed (tested) liquid temperature rise (°C)
- A_{site} is the altitude in meters (ft) of the operating site, minimum value is 1000 m (3300 ft)
- A_{test} is the altitude in meters (ft) of the factory test, minimum value is 1000 m (3300 ft)
- A_o is 1000 m (3300 ft)
- F is 0.04 for self-cooled mode or 0.06 for forced-air-cooled mode

Corrected liquid temperature rise = the tested liquid temperature rise + the correction = $\Delta\theta_o + \Delta\theta_A$

H.3.7 Study Group – Proposed IEEE Guide to Interpretation of Direct and Indirect Tests for the Degradation of Cellulosic Materials in Oil Immersed Transformers – Lance Lewand, Chair, presented the meeting minutes

The study group met and developed a proposed title, purpose and scope to submit a PAR for a new document.

Task Force Tests Degradation of Cellulose in Liquid Type Transformers

- This task force met on Monday, March 24th, 2025 at 1:45PM at the Hyatt Regency in Denver, CO
- 78 people attended the meeting
- Meeting minutes and agenda were not approved as there is not yet an active PAR
- Reviewed guidelines for IEEE SA Meetings
- Reviewed IEEE Codes of Ethics and Conduct
- Reviewed Copyright and Patent Policies
- Goal of the meeting was to come to agreement on a Title, Scope and Propose so that a PAR could be applied for, and secondarily to get a start on assignments of task forces in anticipation that a PAR would be approved.
- This document will be published as a Guide not a standard
- Several titles, scope and purpose were prepared in advanced for discussion at this meeting. A lively discussion took place among those attending in rewording and editing the three items. A discussion of the terms “liquid-immersed” and “liquid-filled” took place and “liquid-filled” won out as the preferred term.
- Based on conversations and debates held in the meeting, the following title, scope and purpose were prepared with the full participation of the audience and are stated as:

TITLE:

IEEE Guide to the Interpretation of Tests for the Degradation of Cellulosic Materials in Liquid-Filled Transformers and Reactors

SCOPE:

This guide applies to liquid-filled transformers and reactors and addresses:

1. *Introduction and history of why cellulose is used, its inherent strengths and weaknesses, and aging mechanisms of cellulose in liquid-filled transformers and reactors containing either mineral oil, natural or synthetic esters, or silicone*
2. *Tests to evaluate degradation of cellulose and interpretation of those results*
3. *Impact of transformer and reactor design, construction and operation*
4. *Fate of cellulose aging markers due to liquid processing*
5. *Calculations, cellulose life estimation and risk assessment*
6. *Case studies and examples*

7. A bibliography of related literature

PURPOSE:

The purpose of this guide is to provide users with a reference concerning the cellulose aging processes in a liquid-filled transformer or reactor, what tests to use and when, and how to interpret those results. Additional information is provided to aid in determining the cellulose life estimation of the transformer or reactor.

A motion was made to accept the Title, Scope and Purpose listed above by Ed Casserly, seconded by Mike Bonn. No nays were recorded and the motion passed unanimously.

Suggested Officers for the official working group once the PAR is approved:

Chair: Lance Lewand, Doble Engineering

Vice Chair: Stuart Chambers, EPRI International

Secretary: Brad Greaves, Weidmann Electrical Technology

The rest of meeting consisted of requesting volunteers to participate for the following task forces that may implemented once a PAR is approved.

The anticipated task forces were listed as follows:

1. Structure of the Task Forces and those that volunteered
 1. Identify IEEE standards that overlap - Alan Sbravati and Yuri Rossini
 2. Introduction – Lance Lewand, Stuart Chambers
 3. Cellulose materials Inside the Transformers - Brad Greaves, Kevin Biggie
 4. Aging Mechanisms, stressors... Lance Lewand, Luis, James Cross, Kevin Biggie, Ed Casserly
 5. Tests – Lance Lewand, Stuart Chambers, Todd Felton, Stephanie Mabrey, Brad Greaves
 6. Impact of Transformer Construction... Alan Sbravati
 7. Impact of Liquid Processing – Lance Lewand, Stuart Chambers, Todd Felton
 8. Calculations – Luiz Cheim
 9. Case Studies – Lance Lewand, Anastasia O'Malley, James Cross
 10. Bibliography- ensure copyright releases - none

The next steps are to bring this to insulating life subcommittee with a motion and then if approved file PAR

Meeting adjourned at 2:48 PM

Last Name/Surname	First Name	Company
Lewand	Lance	Doble
Harper	Robert	Soltex Inc
Gagnon	Jean-philippe	qualitrol
Callsen	Thomas	Weldy Lamont Assoc
Bonn	Mike	Soltex

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Tillery	Timothy	Howard Industries
Hershberger	Benjamin	Midwest Transformer
Kim	Yeounsoo	JST power Equipment
Casserly	Edward	Ergon
Valori	Valentina	Hitachi Energy
Vullo	Stephen	GE Vernova
Walters	Shelby	Howard Industries
Loiselle	Luc	Tetra tech
Cheim	Luiz	Hitachi
Arias-Garcia	Josh	Midwest Electric Transformer Services
Rossini	Yuri	Siemens Energy
Duarte	Fernando	Hitachi Energy
Masoud	Nader	Central Moloney
Britton	Jeffrey	Doble Engineering
Quinones	Manuel	GE Vernova
Quinones	Manuel	GE Vernova
Burk	Griffin	Ergon
Mantoan	Francis	Siemens Energy
Fujimori	Alan	
Sharpless	Samuel	Rimkus
Rutledge	Chris	GeVernova
Garner	Joshua	RESA Power
Biggie	Kevin	Weidmann Electrical Technology
Yeboah	Kwasi	GE Vernova
Da Silva	Roberto	Maschinenfabrik Reinhausen
Hermann	Florian	TRENCH FRANCE
Ray	Sheila	US Nuclear Regulatory Commission
Heinzig	Peter	Weidmann
Bule	John	DTE Energy
Shaikh	Salahuddin	NRG
Demes Jasso	Rolando	Arteche
Dappen	Tim	Cargill
Zhai	Yong	Sieyuan transformer bushing
Ramirez	Ernesto	Arteche
Pepe	Harry	Phenix Technologies
Yeh	Stanley	Shihlin Electric
Hsiao	YUTSO	Shihlin Electric
Matt	Chu	Shihlin Electric
Asam	Yu	Shihlin electric
Michael	Shannon	Rea Magnet Wire
Zhang	Hongzhi	Hitachi Energy
Hrkac	Miljenko	Hitachi Energy

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Satheesh	Nithin	Trench Limited
Giraldo	Orlando	The H-J Family of Companies
Castellanos	Juan	Prolec
Trifunoski	Risto	Trench canada
Jean-Noel	Berube	Rugged Monitoring Quebec Inc
Perjanik	Nick	AVO Diagnostic Services
OMalley	Anastasia	Consolidated Edison Co NY
Mabrey	Stephanie	AVO diagnostics
Thomas	Holifield	Howard Industries Inc
Qiao	Crystal	Trench limited
Pandya	Manan	Siemens Energy
Kwan	Landen	NRV
Propts	Thomas	Dominion Energy
Felton	Todd	MVA Diagnostics, Inc.
Mellin	Toni	Vaisala
Greaves	Brad	Weidmann Electrical Technology, Inc
Almeida	Nabi	Prolec GE
Velasquez	Juan	Magnetron S.A.S.
Murcia	Fredy	Siemens Energy
Minikel	Justin	Eaton
Faur	Florin	Prolec GE
Hollra	Derek	Burns & McDonnell
Crockett	Daniel	Ameren
Rodriguez	Juan	Magnetron
Kurz	Andreas	Maschinenfabrik Reinhausen
Veeran	Kannan	Virginia/Georgia Transformer
Cross	James	Kinectrics
Gupta	Ravi	Megger
Blaszczyk	Piotr	Specialty Transformer Components
Bhattiprolu	Prudhvi Anand	AES

Lance Lewand made a motion to approve a PAR to create a new guide with the title, scope and purpose stated below. Ed Casserly seconded the motion. There was no objection to the unanimous approval of the motion.

TITLE:

IEEE Guide to the Interpretation of Tests for the Degradation of Cellulosic Materials in Liquid-Filled Transformers and Reactors

PURPOSE:

The purpose of this guide is to provide users with a reference concerning the cellulose aging processes in a liquid-filled transformer or reactor, what tests to use and when, and how to interpret those results. Additional information is provided to aid in determining the cellulose life estimation of the transformer or reactor.

SCOPE:

This guide applies to liquid-filled transformers and reactors and addresses:

1. Introduction and history of why cellulose is used, its inherent strengths and weaknesses, and aging mechanisms of cellulose in liquid-filled transformers and reactors containing either mineral oil, natural or synthetic esters, or silicone
2. Tests to evaluate degradation of cellulose and interpretation of those results
3. Impact of transformer and reactor design, construction and operation
4. Fate of cellulose aging markers due to liquid processing
5. Calculations, cellulose life estimation and risk assessment
6. Case studies and examples
7. A bibliography of related literature

H.3.8 Study Group – Non-C57.91 Loading Characteristics – Tim Raymond, Chair,
presented minutes and update

**Task Force Non-C57.91 Meeting
Spring 2025 Meeting**

Mineral Hall (BC), Denver, CO

Monday, March 24th, 2025

11:00AM – 12:15 PM Mountain Time Zone

Chair: Tim Raymond Vice-Chair: Empty Secretary: Empty

UNAPPROVED MINUTES (provided by Jeremiah Bradshaw)

SUMMARY: This meeting is to discuss a need for end user guidance for loading transformers with non-conventional (ie. Not covered by C57.91) insulation systems. The goal of this group is to determine what gaps are present in current IEEE Transformers Committee documents and provide a recommendation to the ILSC on what revisions might need to be made or to recommend a new document altogether.

There were attendees. This being the first meeting of this task force, all 56 attendees requesting membership will be granted membership.

MINUTES: Slide 1: There are other standards that touch on this topic a little:

- C57.91: Guide for Loading of Mineral Oil Transformers
- C57.154: Temperatures above Conventional Limits Using High-Temp Insulation Systems
- 1276: Application of High Temp
- C57.12.00: General
- IEEE St 1: Temp Limits
- Maybe:
 - C57.100: Test Procedure for Thermal Eval
 - C57.162: Moisture Related

Comments:

Tom Prevost:

- There are some new documents that are being worked on in IEC 60076-1 (General), 60076-2 (Testing). IEC 60076-5 (Loading).
- They are also looking into a moisture related topic for accelerated aging.
 - C57.162 started this work.

Slide: Some Specific Concerns

- Loss-of-life is covered under 1276
- Temp Gradient
 - Included in C57.154
- Updated Thermal Models
- Temperature Limits
- Bubble Evolution
- C57.12.00: Allowable temp rise at nameplate

Comments:

Aleksandr Levin (Weidmann)

- We need something similar to C57.91 for all of the new cases.
- Cellulose should be discussed individually as well because it is different once mineral oil is added.

Jinesh Malde (Midel)

- We need to define what “non-C57.91” means. It sounds like it is anything different than a conventional system with a 65-degree C rise.

Aleksandr Levin:

- “even with a 65 rise unit, if you have a high temp insulation system does that affect the loading?”

Tom Prevost (Weidmann):

- we can’t completely go away from materials; example, bubble evolution will be impacted by the material.

David Wallach (Duke):

- we’ve seen failures in the leads that have cellulose while the windings have aramid. The designer and end user need to understand the temperature limits to prevent failures.

Aslendo:

- we can’t be completely agnostic of materials.

Tim Raymond:

- Where do we feel like this information should reside? (C57.91, C57.154, etc)

David Wallach:

- If you start with C57.91 as the template, and start to edit it, then look back at it and see if it can find a good home.

Adriana Cisco Sullberg (Salt River Project):

- No matter where we put this information, an end user will need to follow a decision tree to get to the right location information. So it should go into C57.91.

Anastasia O’Malley (ConEd):

- There is a need for a specific document dedicated to hybrid insulation systems.

[Unsure name]:

- There should be a separate guide that partners with C57.154.

Jinesh Malde:

- We do need a document, but we can treat the new document as a partner to C57.91.

Kevin Biggie (Weidmann):

- 1276 has an annex B that is a loading guide for this situation, but it shouldn't be the place for this information.

Tom Prevost:

- maybe we should start with looking at a title, scope, and purpose to help shape the direction of the new document.

[Unsure name]:

- if we open this to alternate liquids and solid insulation systems, it would take a long time to build these models.

David Wallach:

- we shouldn't jump straight into a title, scope, and purpose until we know what we want to write. We could run straight through a PAR and not achieve anything.

Bradshaw:

- should it be included as an annex in C57.91 with the key information we know that an end user should consider when they have a hybrid insulation system or anything different than the scope of C57.91.

Anastasia O'Malley:

Motion: "To present to the insulating life subcommittee, to create a study group for developing a PAR to create a title, scope, and purpose for a loading guide for alternate insulation systems."

Tom Prevost second.

No objections from the group [unanimous approval]

Aleksandr Levin:

- We need to define the term for high temperature operating conditions. We can do that at the next meeting.

Sam Sharpless (Rimkus):

- this group needs a secretary and vice chair as soon as possible since this discussion is rapidly moving.

Garrett Bradshaw volunteers as the secretary.

Sami Debass (EPRI) volunteers for vice chair.

Your name	Company/Affiliation
Adriana Cisco Sullberg	Salt River Project
Ajay Palhatiya	Virginia Transformers Corp
Alan H. Stuyven	Romagnole
Ali Naderian	Potencia Partners
Amitabh Sarkar	Virginia Transformer Corporation
Amitkumar Singh	Con Edison Company of New York
Anastasia OMalley	Consolidated Edison Co of NY
Andy Steineman	Delta Star, Inc.
Anna Zhou	JST Power
Anthony Natale	HICO America

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Aparna Vedantham	Virginia Transformer Corporation
Arvind kumar	Delta star inc
Asam Yu	Shilling electric
Attila Gyore	MIDEL and MIVOLT Fluids Ltd
Balaji Janakiraman	Virginia Transformer
Bernard LaBean Jr	Consumers Energy Company
Brian McBride	Cargill
Bruce Forsyth	Cargill
Chris Powell	Intermountain Electronics
Cole Van Dreel	American Transmission Co.
Cuauhtemoc Ortiz	Niagara Power Transformer Corp.
dalho kim	iljin electric
Daniel Blaydon	Baltimore Gas and Electric
Daniel Obregón	TTE Transformers
Danny Schwartz	Quality Switch
Dario Segovic	Koncar Power Transformers Ltd.
David Wallach	Duke Energy
Derek Hollrah	Burns & McDonnell
Diaconu dimitru	Delta Star inc
Dinesh Sankarakurup	Duke Energy
Zach Draper	Delta-X
Dumitru Diaconu	Delta Star Inc
Eduardo Tolcachir	TTE Transformers
Eduardo Garcia	Siemens Energy
Egon Kirchenmayer	Siemens-Energy
Egui Espitia	
Emilio Morales-Cruz	Qualitrol
Eric Elson	San Diego Gas and Electric
Fei Yang	Hitachi Energy
Fidel Castro	SDGE
Filip Mikulecky	Siemens Energy
Florian Heurian	Trench France
Fredy Murcia	Siemens Energy
Gabriel Delgado	Invenergy
Gabriel Mamede	Siemens Energy
Garret sarkinen	Xcel energy
Garrett Bradshaw	Howard Industries, Inc.
Giovanni Hernandez	
Decanini	Virginia Transformer Corp
Grace Guang Yuan	Hitachi energy
Hakan Sahin	Virginia transformer
Isaac Abdalla	HICO America
Jaber shalabi	Vantran industries

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James Farmer	Bureau of Reclamation
Jason Snyder	FirstEnergy
Jason Varnell	Doble Engineering
Jean-Noel Berube	
Jean-philippe Gagnon	qualitrol
Jeremiah Bradshaw	Bureau of Reclamation
Jesus Sanchez rodriguez	Vertiv
Jiahao Xie	S&C Electric Company
Jinesh Malde	MIDEL & MIVOLT FLUIDS INC
Joe Nims	Allen & Hoshall
John Bule	DTE Energy
John K John	Virginia Transformer Corp
John Wagner	AEP
Jonathan Reimer	FortisBC
Jonathon Stauffer	Bureau of Reclamation
Josh Bohren	PacifiCorp
Josipa Brekalo	Koncar D&ST
Juan Castellanos	Prolec
Juan Reyes perez	Hitachi Energy
Juan Rodriguez	Magnetron
Kayland Adams	Prolec-GE Waukesha
Kevin Biggie	Weidmann Electrical Technology
Kyle Stechschulte	AEP
KYUNGCHAN,AN	HYOSUNG
Laszlo Kadar	Laszlo & Associates
Leonard Torchia	PSE&G
Manan Pandya	Siemens Energy
Marco Espindola	Hotachi Energy
Mark Lachman	Doble
Mark Tostrud	Dynamic Ratings
Matija Koprivnjak	Končar D&ST
Matt Chu	Shihlin Electric
Matt Weisensee	PacifiCorp
Mickel Saad	Hitachi Energy
Miguel Fernandez	Braintree Electric Light Dept.
Monil Patel	Pacific Gas and Electric
Moonhee Lee	Hammond Power Solutions
Nick Jensen	Delta Star
Nitesh Patel	Hyundai Power Transformers
Onome Avanoma	MJ Consulting
Patrick Foster	NextEra Energy
Peter Heinzig	Weidmann
Phil Hopkinson	HVOLT Inc.

Prudhvi Anand Bhattiprolu	AES
Qasim Khan	NEETRAC-Georgia Tech
Raymond Frazier	Ameren
Roger Hayes	GE Vernova
Sami Debass	EPRI
Samuel Sharpless	Rimkus
Saramma Hoffman	PPL
Stephen Antosz	Consultant
Sudip Chanda	Delta Star Inc
Sukin Jang	ILJIN Electric
Thomas Holifield	Howard Industries
Tom Prevost	Weidmann
Verena Pellon	FPL and NextEra
Will Elliott	AEP SWEPCO
William Boettger	Boettger Transformer Consulting LLC
William Griesacker	WGA
Zach's weiss	WEG transformers
Zan Kiparizoski	Howard Industries
Tim Raymond	Inductive Reasoning

Tim Raymond made a motion for the study group to proceed with development of a PAR title, scope and purpose for a new document that will be a loading guide for alternate insulation systems. Eduardo Garcia Wild seconded the motion. There was no objection to the unanimous approval of the motion.

H.3.9 EPMC 0197 – Entity Proposal Management Committee Project 0197 - Guide for Inversion Detection of Hot-Spot Temperature and Loading Capacity in Oil-Immersed Transformers from the State Grid Anhui Electric Power Co. LTD Research Institute – Weijun Li, Liaison Representative presented the update

The liaison representative has been guiding the group to assist them to understand the IEEE process. They had held a virtual meeting and have been communicating via email. The group has drafted a white paper, “Technical Report for Inversion Detection of Oil-immersed Transformer Hot-spot Temperature” for peer review.

H.3.10 EPMC 0184 – Entity Proposal Management Committee Project 0184 - Guide for Measurement of the Polymerization Degree of Insulating Paper-Paperboard for Power Transformers Based on Terahertz Time Domain Spectroscopy from the State Grid Shanxi Electric Power Research Institute – Sam Sharpless presented the status

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During the Fall 2024 meeting, the ILSC had accepted sponsorship of this entity project. However, no volunteers came forward as a liaison representative to organize and guide the group through the IEEE process. Once completed, the document would be under Subcommittee supervision for future enhancement and revision. If rejected, the document will proceed without Transformer Committee supervision.

The chair again requested volunteers to serve as a liaison for this project.

Three volunteers came forward to act as liaison representatives for this project. It was agreed that these three volunteers would work together as ILSC liaison.

- Hemchandra Shertukde, University of Hartford
- Solomon Chiang, the Gund Company
- Mario Alonso, Georgia Transformer

H.4 Old Business

None.

H.5 New Business

None.

The meeting adjourned at 9:10am MDST.

Attendance:
106 Members
131 Guests

Membership	Last Name	First Name	Company
Guest	Abdalla	Isaac	HICO America
Member	Adams	Kayland	Prolec-GE Waukesha
Member	Almeida	Nabi	Prolec GE
Guest	Alonso	Mario	
Guest	An	KyungChan	HYOSUNG
Member	Antosz	Stephen	Consultant
Guest	Arnold	Elise	SGB
Member	Arteaga	Javier	Hitachi Energy
Member	Avanoma	Onome	MJ Consulting
Member	Ballard	Robert Casey	DuPont
Member	Bargone	Gilles	FISO
Guest	Bates	Jared	Oncor Electric Delivery
Guest	Beaudoin	Jason	Weidmann
Guest	Berube	Jean-Noel	Rugged Monitoring Quebec Inc
Guest	Bhattiprolu	Prudhvi Anand	AES
Member	Biggie	Kevin	Weidmann Electrical Technology
Member	Blaszczyk	Piotr	Specialty Transformer Components
Member	Boettger	William	Boettger Transformer Consulting LLC

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Guest	Bohrn	Josh	PacifiCorp
Guest	Bonn	Mike	Soltex
Member	Botti	Michael	Hyosung HICO
Guest	Bradshaw	Garrett	Howard Industries, Inc.
Guest	Bradshaw	Jeremiah	Bureau of Reclamation
Guest	Brekalo	Josipa	Koncar D&ST
Guest	Brzoznowski	Steven	BPA
Guest	Bule	John	DTE Energy
Guest	Burke	David	Xcel Energy
Guest	Calil	Wilerson	Hitachi Energy
Member	Calitz	David	Siemens Energy
Member	Carrizales	Alfredo	Prolec GE
Member	Casallas	Camilo	Trench
Member	Casserly	Edward	Ergon, Inc
Member	Castellanos	Juan	Prolec
Guest	Caverly	David	Trench Limited
Guest	Chanda	Sudip	Delta Star Inc
Member	Cheim	Luiz	Hitachi
Member	Chiang	Solomon	TGC
Guest	Colopy	Craig	Retired from EATON
Member	Da Silva	Roberto	Maschinenfabrik Reinhausen
Guest	Dappen	Tim	Cargill
Member	Debass	Sami	EPRI
Member	Delgado Zamora	Gabriel	Invenergy
Guest	Diaconu	Dumitru	
Member	Digby	Scott	Duke Energy
Guest	Dillon	Nikolaus	Dominion Energy
Guest	Duarte	Fernando	HitachiEnergy
Guest	Duffy	Jesse	Nashville Electric Service
Member	Dulac	Hakim	Advanced Power Technologies
Member	Dutta Roy	Samragini	Siemens Energy Inc
Guest	Elson	Eric	San Diego Gas and Electric
Member	Ermakov	Evgenii	Hitachi Energy
Member	Espindola	Marco	Hitachi Energy
Guest	Espitia	Egui	Reinhausen Manufacturing Inc
Guest	Felton	Todd	MVA Diagnosticd
Guest	Fernandez	Miguel	Braintree Electric
Member	Ferreira	Marcos	FEMA
Guest	Fujimori	Alan	Romagnole
Guest	Gagnon	Jean-philippe	Qualitrol
Guest	Gamboa	Jose	The H-J Family of Companies
Member	Garcia	Miguel	Hitachi Energy
Member	Garcia Wild	Eduardo	Siemens Energy
Member	Gardner	James	Prolec-GE Waukesha
Guest	Garner	Joshua	RESA Power
Guest	Garza	Gilberto	Prolec GE
Member	Gaytan	Carlos	Prolec GE
Member	Ghosh	Rob	GE Vernova
Member	Gorzin	Alireza	Black & Veatch

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Guest	Gossett	Shawn	Ameren
Guest	Greaves	Brad	Weidmann Electrical Technology, Inc.
Member	Griesacker	Bill	WGA
Guest	Guinand	Benjamin	Power Magnetics
Member	Gyore	Attila	MIDEL and MIVOLT Fluids Ltd
Guest	Hampton	Kevin	Siemens Energy
Member	Hayes	Roger	GE Vernova
Guest	Heinzig	Peter	Weidmann
Guest	Hernandez-mejia	Jean Carlos	NEETRAC GEORGIA TECH
Member	Hoffman	Saramma	PPL
Guest	Holifield	Thomas	Howard Industries Inc
Guest	Hollrah	Derek	Burns & McDonnell
Member	Hopkinson	Phil	
Member	Hossain	Saif	Trench Canada
Member	Hrkac	Miljenko	Hitachi Energy
Member	Issack	Ramadan	AEP
Guest	Janakiraman	Balaji	Virginia Transformer
Guest	Jang	Donghyun	LS ELECTRIC
Guest	Jarosz	Patrycja	IEEE SA
Member	Jensen	Nick	Delta Star
Guest	Jeong	chanmin	HD Hyundai
Member	John	John	Virginia Transformer Corp.
Guest	Kadar	Laszlo	Laszlo & Associates Inc.
Member	Kennedy	Sheldon	Sheldon P Kennedy Engineering PLLC
Member	Khan	Qasim	NEETRAC-Georgia Tech
Guest	kim	dalho	iljin electric
Guest	Kim	Heonsu	LS Electric
Member	Kim	Yeounsoo	JST Power Equipment
Member	King	Gary	Consultant
Member	Kiparizoski	Zan	Howard Industries
Member	Kirchenmayer	Egon	Siemens Energy
Guest	Koinis	Nicholas	CenterPoint energy
Guest	Koprivnjak	Matija	Končar D&ST
Guest	Kosedagi	Nihat	ERMCO
Guest	Kumar	Arvind	Delta star inc
Guest	Kurz	Andreas	Reinhausen Germany
Guest	Kwasi	Yeboah	GE Vernova
Guest	LaBean Jr	Bernard	Consumers Energy Company
Guest	Labh	Ashwini	Hitachi Energy
Guest	Lapointe	Sylvain	Rugged Monitoring
Guest	Larison	Andrew	Hitachi Energy
Guest	Leal	Fernando	Prolec ge
Member	Lee	Moonhee	Hammond Power Solutions
Member	Levin	Aleksandr	Weidmann
Guest	Lewand	Lance	Doble
Member	Li	Weijun	Braintree Electric Light Department
Guest	Loiselle	Luc	Tetra tech
Guest	Lopes	Ricardo	Efacec
Guest	Lopez	Libardo	Hitachi Energy

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Member	Mabrey	Stephanie	Avo
Member	Malde	Jinesh	MIDEL & MIVOLT FLUIDS INC.
Member	Mamede	Gabriel	Siemens Energy
Member	Mani	Kumar	Duke Energy
Guest	Manzano	Moses	Hyosung HICO
Guest	Mellin	Toni	Vaisala
Guest	Mendez	Omar	Prolec
Guest	Merrill	Logan	OMICRON
Guest	Mikulecky	Filip	Koncar Power Transformers Ltd.
Member	Mills	Francis	POWER Engineers
Member	Montanha	Juliano	Siemens Energy
Member	Montanha	Juliano	Siemens Energy
Member	Morales-Cruz	Emilio	Qualitrol
Guest	Munoz	Marta	Hitachi Energy
Guest	Murcia	Fredy	Siemens Energy
Guest	Murillo	Hugo	The H-J Family of Companies
Member	Murray	David	TVA
Guest	Nader	Masoud	Central Moloney
Guest	Nambi	Shankar	Bechtel Energy, Inc.
Guest	Narawane	Aniruddha	Eaton
Guest	Natale	Anthony	HICO America
Guest	Neild	Kris	Megger
Member	Omalley	Anastasia	Con Edison NY
Guest	Ortiz	Juan	Reinhausen Manufacturing
Guest	Palhatiya	Ajay	Virginia transformer inc
Guest	Pandya	Manan	Siemens Energy
Member	Panesar	Parminster	Virginia Transformer Corp
Guest	Park	Dean	Hyosung Hico
Guest	Park	Jaeyong	LS Electric
Member	Parkinson	Dwight	Eaton Corp
Guest	Patel	Vinay	Con Edison
Guest	Patel	Sanjay	Royal Smit Transformers
Guest	Patel	Nitesh	Hyundai Power Transformers
Guest	Patel	Monil	Pacific Gas and Electric
Member	Patel	Poorvi	EPRI
Guest	Pedro	Pedro	Efacec Energia
Guest	Pepe	Harry	Phenix Technologies
Guest	PEREZ	MARCELINO	PROLEC
Guest	Peuc	Luka	Končar D&ST
Member	Pointner	Klaus	Trench Austria GmbH
Guest	Post	Nicholas	WEC Energy Group
Guest	Poulin	Bertrand	Hitachi Energy
Member	Prevost	Tom	Weidmann
Member	Radu	Ion	Hitachi Energy
Guest	Rapelly	Laxman	Georgia Transformer Corporation
Member	Raymond	Timothy	Inductive Reasoning
Guest	Reimer	Jonathan	FortisBC
Guest	Reiss	Tony	Custom Materials, Inc.
Guest	Rodriguez	Juan	Magnetron

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Member	Ronchi	Rodrigo	WEG Transformers México
Guest	Rossini	Yuri	Siemens Energy
Guest	Rutledge	Chris	GeVernova
Guest	Ryu	Hyounggon	HD hyundai electric
Member	Saad	Mickel	Hitachi Energy
Member	Sahin	Hakan	Virginia Transformer Corp.
Guest	Samuel	Brodeur	Hitachi
Guest	Sanchez rodriguez	Jesus	Vertiv
Member	Sankarakurup	Dinesh	Duke Energy
Member	Sarkar	Amitabh	Virginia Transformer Corporation
Guest	Sarkinen	Garret	Xcel Energy
Member	Sbravati	Alan	Hitachi Energy
Guest	Schiessl	Markus	SGB
Guest	Schott	Cody	The H-J Family of Companies
Guest	Schrammel	Alfons	Siemens Energy
Guest	Schumack	Joseph	Ameren
Member	schweiger	ewald	siemens energy
Guest	Segovic	Dario	Koncar Power Transformers Ltd.
Member	SEN	CIHANGIR	Duke Energy
Guest	Sethi	Kabir	Hitachi Energy Germany Ag
Guest	Shaikh	Salahuddin	NRG Energy
Member	Sharp	Michael	Trench Limited
Member	Sharpless	Samuel	Rimkus
Member	Shertukde	Hemchandra	UHART/DDI
Guest	Shull	Stephen	BBC Electrical Services Inc
Member	Sinclair	Jonatha	Black and Veatch
Guest	Singh	Amitkumar	Consolidated Edison Company of New York
Guest	Snyder	Jason	FirstEnergy
Member	Som	Sanjib	PTT, LLC
Guest	Stankes	David	3M
Member	Steichschulte	Kyle	Aep
Guest	Steele	Hampton	hasteele@tva.gov
Guest	Sweetser	Charles	OMICRON electronics Corp. USA
Member	Szczecowski	Janusz	Maschinenfabrik Reinhausen GmbH
Member	Sze	Matthew	Omicron electronics
Guest	Tan	Jonathan	Northern Transformer
Member	Tanaka	Troy	Burns & McDonnell
Guest	Tatu	Val	Powersmiths
Member	Reed	Scott	MVA
Guest	Thiede	Andreas	HIGHVOLT Dresden
Member	Thomas	Scott	Hitachi Energy
Guest	Tillery	Timothy	Howard Industries
Guest	Tirado	Fernando	Prolec GE
Guest	Tolcachir	Tolcachir	TTE Transformers
Guest	Torchia	Leonard	PSE&G
Member	Tostrud	Mark	Dynamic Ratings
Member	Van Dreel	Cole	American Transmission Company
Member	Varghese	Ajith	Prolec GE Waukesha
Member	Varnell	Jason	Doble Engineering

Annex H

Guest	Velasquez	Juan	Magnetron sas
Guest	Villa	Hector	Ecuatran SA
Member	Vir	Dharam	Prolec GE
Member	VonGemmingen	Richard	Dominion Energy
Member	Vyas	Pragnesh	Cleveland Cliffs
Guest	Wagner	John	AEP
Member	Wallach	David	Duke Energy
Member	Wang	Evanne	Dupont
Guest	Washburn	Alan	Burns & McDonnell
Guest	Watson	Joshua	NPPD
Member	Webb	Bruce	Knoxville Utilities Board
Member	Weisensee	Matt	PacifiCorp
Member	Weiss	Zachery	WEG transformers
Guest	Weyandt	Paul	Schneider Electric
Member	White	Joe	POWER Engineers
Member	Wong	Terry	Trench Limited
Guest	Wright	Jeffrey	Duquesne Light
Member	Yang	Fei	Hitachi Energy
Member	Yuan	Guang (Grace)	Hitachi Energy
Member	Yun	Joshua	Virginia Transformer Corp
Guest	Zhang	Hongzhi	Hitachi Energy
Guest	Zhou	Anna	JST Power
Member	Ziomek	Waldemar	PTI Transformers LP

37 Guests requested membership:

Last Name	First Name	Company
Alonso	Mario	
Bohrn	Josh	PacifiCorp
Bradshaw	Garrett	Howard Industries, Inc.
Bradshaw	Jeremiah	Bureau of Reclamation
Calil	Wilerson	Hitachi Energy
Chanda	Sudip	Delta Star Inc
Dappen	Tim	Cargill
Duarte	Fernando	HitachiEnergy
Elson	Eric	San Diego Gas and Electric
Garza	Gilberto	Prolec GE
Holifield	Thomas	Howard Industries Inc
Jeong	chanmin	HD Hyundai
Kosedagi	Nihat	ERMCO
Kumar	Arvind	Delta star inc
Kwasi	Yeboah	GE Vernova
Labh	Ashwini	Hitachi Energy
Leal	Fernando	Prolec ge
Murcia	Fredy	Siemens Energy
Murillo	Hugo	The H-J Family of Companies
Nader	Masoud	Central Moloney
Narawane	Aniruddha	Eaton

Annex H

Pandya	Manan	Siemens Energy
Patel	Vinay	Con Edison
Patel	Nitesh	Hyundai Power Transformers
PEREZ	MARCELINO	PROLEC
Rapelly	Laxman	Georgia Transformer Corporation
Sanchez rodriguez	Jesus	Vertiv
Sarkinen	Garret	Xcel Energy
Sethi	Kabir	Hitachi Energy Germany Ag
Shaikh	Salahuddin	NRG Energy
Singh	Amitkumar	Consolidated Edison Company of New York
Tan	Jonathan	Northern Transformer
Tatu	Val	Powersmiths
Tirado	Fernando	Prolec GE
Velasquez	Juan	Magnetron sas
Weyandt	Paul	Schneider Electric
Zhang	Hongzhi	Hitachi Energy

Respectfully submitted,

Anastasia O'Malley
Secretary, Insulation Life Subcommittee

Annex J Performance Characteristics Subcommittee (PCS)

March 26th, 2027, Hyatt Regency, Denver, CO

UNAPPROVED MINUTES

Chair: Sanjib Som

Vice Chair: Kris Zibert

Secretary: John Wagner

J.1 Introduction / Attendance

Quorum was achieved with 76 members present. In addition, 117 guests were present at the meeting. The total attendance at the meeting was 193. Guests should contact the Vice Chair to request membership. Their requests for membership and past attendance will be reviewed. If they meet the membership requirements, they will be granted membership before the next meeting in Bonita Springs, Florida October 19-23 2025.

J.2 Chairman's Remarks

The Chair gave the Chairman's Remarks.

The Chair introduced himself, the Vice Chair and secretary and provided the below updates and comments.

The Chair discussed that the meeting would be recorded for minutes purposes and then deleted.

The Chair asked anyone with new business to submit said business in writing prior to the meeting.

The Chair gave a reminder regarding affiliation data as a requirement and to continue updating attendance manually.

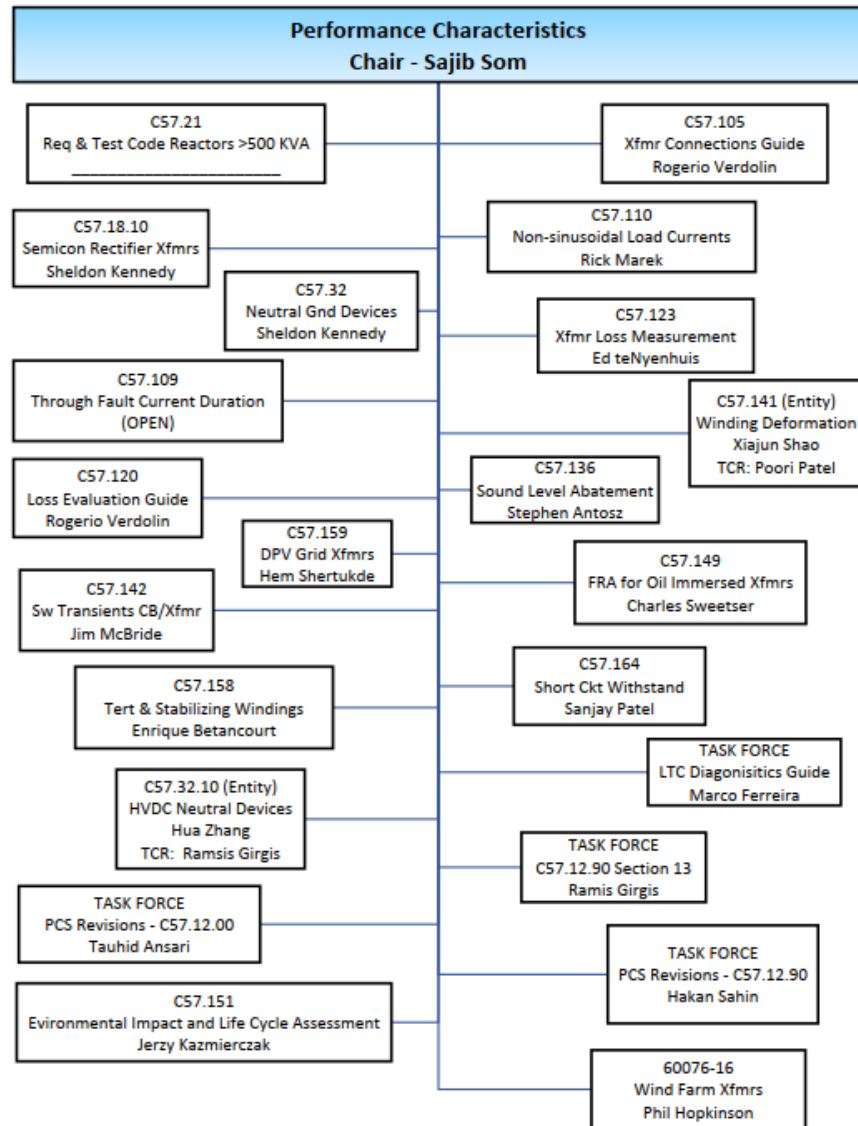
PCS Responsibilities: Defined by the Transformers Committee Organization and Procedures Manual.

The Performance Characteristics Subcommittee shall be responsible for the following:

- Studying and reviewing the treatment of loss, impedance, exciting current, inrush current audible sound and vibration, and other performance characteristics and their methods of application, measurement, or test for liquid filled transformers and liquid filled and dry type reactors.
- Studying and reviewing the treatment of the performance characteristics of other special use transformers e.g. photovoltaic, wind, and rectifier transformers.
- Developing and maintaining related standards, recommended practices, and guides for such criteria

- Coordinating with other technical committees, groups, societies, and associations as required

Standards Supported by PCS:



- C57.12.00 – TF to provide PCS revisions – T. Ansari
- C57.12.90 – TF to provide PCS revisions – H. Sahin (test code) & R. Girgis (audible sound)
- C57.18.10 – Semiconductor rectifier transformers – S. Kennedy

- C57.21 – Requirements & Test Code For Shunt Reactors >500kVA – S. Som
- C57.32-2015 – Neutral Grounding Devices (2025) – S. Kennedy
- C57.32.10 – Entity WG Neutral Grounding Reactors Guide for HVDC Converter Transformers – H. Zhang (TCR: R. Girgis)
- C57.105 – Transformer connections guide – R. Verdolin
- C57.109 – Through Fault Current Duration – OPEN
- C57.110 – Xfrmr Capability when Supplying Nonsinusoidal Load Currents – R. Marek
- C57.120 – Guide for loss evaluation – R. Verdolin
- C57.123 – Transformer Loss Measurement – E. teNyenhuis
- C57.136 – Sound Abatement Guide – S. Antosz
- C57.141 - Entity - Winding Deformation – X. Shao (TCR: P. Patel)
- C57.142 – Switching Transients Circuit breaker/Transformer – J. McBride
- C57.149 – FRA for Oil Immersed Transformers – C. Sweetser
- C57.158 – Tertiary & Stabilizing Windings (2027) – E. Betancourt
- C57.159 – DPV Transformers (2026) – H. Shertukde
- C57.164 – Short Circuit Withstand – S. Patel
- TF for Insulating Fluid for Factory Testing – E. teNyenhuis
- TF for LTC Diagnostics Guide – M. Ferreira
- 60076-16 – Wind Turbine Generator Transformers – P. Hopkinson
- C57.151 Eval Guide Environmental Impact of Transformers & Reactors – J. Kazmierczak

Status of Active PAR's:

- **2025 PAR's**
 - C57.142 Transient Guide (Comment Resolution)
 - C57.141 Entity WG Guide for Detection, Monitoring and Evaluation of Winding Deformation
- **2027 PAR's**
 - C57.32 Neutral Grounding Devices
 - C57.158 Application of Tertiary and Stabilizing Wdgs Guide
- **2028 PAR's**
 - C57.159 DPV Transformers Guide
 - C57.151 Enviro & Life Cycle Assessment (New WG)

Status of Standards without active PARs

- C57.120-2017 – Loss Evaluation Guide (2027)

- **60076-16-2018 – Wind Turbine Generator Transformers (2028)**
- **C57.109-2018 – Through Fault Current Duration (2028)**
- **C57.110-2018 – Transf. Capability when Supplying Nonsinusoidal Loads (2028)**
- **C57.105-2019 – Transformer connections guide (2029)**
- **C57.123-2019 – Loss Measurement Guide (2029)**
- **C57.164-2021 – Short Circuit Withstand Guide (2031)**
- **C57.21-2021 – Shunt Reactors over 500kVA (2031)**
- **C57.18.10-2021 – Semiconductor Rectifier Transformers (2031)**
- **C57.136-2023 – Sound Level Abatement Guide (2033)**
- **C57.149 – FRA Guide (2034)**

Performance Characteristics Subcommittee Membership Requirements

- Voting membership may be requested and granted after attending three of the last five meetings.
- If a voting member misses more than two consecutive meetings, his or her voting privileges may be revoked. Notification will be sent if voting privileges are revoked.
- Refer to TC P&P 4.3.1 for more information.

Performance Characteristics Subcommittee WG / TF Leaders

- Issue agenda at least 30 days ahead of time
- Minutes are due in 15 days; please get a rough draft of them to us today in MS Word (not PDF) format
- Please keep your webpages up to date – review regularly and send any content/files to tc-webmaster@ieee.org.
- A patent and copyright call must occur at every WG/TF meeting
- Please send to Patrycja Jarosz (p.jarosz@ieee.org) your WG roster by April 10th, 2025, including last name, first name, email address, and voting status.

Performance Characteristics Subcommittee Meeting Minutes

- Name of the group, time, date, and location of meeting
- Officers' names, meeting participants, member status, and affiliations
- Chair's remarks and reminders of IEEE policies (Patent and Copyright)
- Approval of minutes of previous meeting and agenda
- Technical topics: Brief summary (discussions and conclusions, motions exactly as they are stated, including the names of proposer and seconder, and the outcome of each motion)
- Action items, items reported out of executive session
- Recesses and time of final adjournment
- Next meeting—date, time, and location

WG / TF Balloting Reminder

- Working Groups must achieve a 2/3 majority to submit a document for Sponsor Ballot.
- The Subcommittee must achieve a simple majority to submit a document for Sponsor Ballot.

Attendance / Membership – moved to Guest status

The following member missed more than 2 consecutive meetings and have been moved to “Guest” status:

Barry Beaster

Please contact Kris by sending him a message or see him after the meeting if you believe your membership status is not accurate and/or you would like to become a member.

Attendance / Membership – New Members

The following Guests requested membership at the Fall 2024 meeting and have attended 3 of the past 5 meetings:

Christopher Johnson

Akash Joshi

Hugo Murillo

Jason Snyder

Krishnamurthy Vijayan

Attendance / Membership – Quorum determination

- Current breakdown of the Subcommittee:
 - 108 Members
 - 55 are needed for a quorum
- Quorum was established with 76 members in attendance.

J.3 Approval of Agenda

The Chair presented the agenda and entertained a motion to approve. The agenda had been sent to the members by email several weeks prior to the meeting. The motion was made by J. McBride and seconded by R. Ghosh. The motion passed by unanimous consent.

J.4 Approval of Last Meeting Minutes

The Chair presented the minutes of meeting held in October 2024 and entertained a motion to approve. The minutes had been sent to the members by email several weeks prior to the meeting. The motion was made by D. Sauer and seconded by A. Sarkar . The motion passed by unanimous consent.

J.5 Minutes from Working Groups and Task Force

The following WG and Task Force reports were received (the reports are appended later).

• WG Eval Guide Environ Impact of Trans & Reactors PC57.151	J. Kazmierczak
• TF Audible Sound Rev to Test Code	R. Girgis
• TF Transformer Data Required for System Studies	J. Watson
• TF Continuous Revisions to C57.12.00	T. Ansari
• WG Standard for DPVTs C57.159	H. Shertukde
• TF Continuous Revisions to Test Code C57.12.90	H. Sahin
• WG Sw Transients Ind by Xfmr/Bkr Interaction PC57.142	J. McBride
• WG C57.158 App. Guide for Tertiary and Stabilizing Windings	E. Betancourt
• WG IEEE Neutral Grounding Devices PC57.32	S. Kennedy
• WG PC57.32.10 Entity HVDC Neutral Grounding Device Guide	Z. Hua
• WG PC57.141 Entity Winding Deformation Guide	X. Shao

Below are highlights that were discussed at the PCS meeting:

1) WG Eval Guide Environ Impact of Trans & Reactors PC57.151 J. Kazmierczak

- **Quorum was taken. There were 78 attendees total with 36 being members. 37 members were needed to achieve quorum. Therefore, quorum was not achieved**
- **The Agenda was presented, but couldn't be approved due to lack of quorum.**
- **Approval of MoM's from St. Louis could not be approved due to lack of quorum.**
- **M. Nolte with Kewitt presented section 3 outline, as this is the initial section that will drive the rest of the guide**
- **J. Sen, Duke Energy, asked about low loss design aspects, suggested just listing losses.**
- **L. Chem, Hittachi Energy, suggested having additional focus of operation (loading) & maintenance. Also would consider the strategy to have spares, etc.**
- **V. Valori, Hittachi Energy, suggested to show/compare both concepts of cradle to gate vs. cradle to grave**
- **S. Kabir, Hitachi Energy, asked if we will include alternative liquids as well.**
- **Hitachi Energy if we consider in the LCA the loading profile**
- **V. Valori, Hitachi Energy, why is noise level included in the LCA?**
- **C. Ploetner, Siemens Energy, the guide must be equally applicable for everyone**
- **J. Sen, Duke Energy, how will this agenda be allocated to work on?**
- **J. Tan, Northern Tx, the design aspects included are interesting & relevant. We need to make sure we can also look at heat & noise emissions, as the guide's title does reference environmental impacts as well as LCA.**
- **P. Wench, Schneider Electric, happy to be included in scoping piece.**
- **L. Kovacic, Koncar, regarding the losses & noise level it is not the LCA basis to look at heat or noise emissions, but to look at it from CO2 emissions.**

- H. Zhang, Hitachi Energy, need to also mention the heating/cooling of the tx. (temp rise).
- F. Mills, other aspects should be included in the design aspects (thermal capability, dielectric capability, losses, noise, etc.)
- E. Kritic, Hitachi Energy, will it be related only to Tx. & Reactor or will this be extended to other aspects, such as substations (i.e. alternative liquids allow for smaller substation footprint). Also, use sensitivity calculation for loading, evaluate the effect at different loading points
- P. Patel, EPRI, the detailed discussions should be had in the task forces.
- J. Sen, Duke Energy, use design optimization as a title, with the sections listed as losses, noise, etc. instead of using low.
- J. Tan, Northern Tx., also volunteered to work on section 3.
- J. Sen, Duke Energy, motioned to dismiss & M. Schiessl (SGB) seconded.

2) TF Audible Sound Code Revision

R. Girgis

- The TF met at 1:45 PM, on Monday, March 24, 2024. The meeting was attended by 32 members and 89 Total.
- Main item TF is working on is how to specify the Sound level of PAs to limit impact of PA noise on noise of the main transformer
- S. Digby presented experience that Duke Energy have had with noisy PAs and how these incidents required un-tanking of Power transformers and replacing the PAs.
- After some discussions, the proposed text will be shared with attendees of the TF meeting and comments will be reviewed and presented at the Fall meeting of the TF

3) TF Transformer Data Required for System Studies

J. Watson

- The TF met for at 9:30AM on Monday, 3/24/25 with 47 attendees, including 9 of our 17 members for a quorum. The Agenda and previous minutes were approved.
- There were two presentations on transformer data required for system studies programs. These will be posted on the TX Committee Website on the PCSC page.
- Dr. Rohitha Jayasinghe and Dr. D. Muthumuni from Manitoba Hydro's Power Systems Technology Centre presented remotely and Y. Liang from RTDS Technologies presented in person. Both presentations discussed the different types of studies and the transformer data required for the transformer models in those programs on a remote.
- The TF plans to have a remote meeting in 4-6 weeks to start work on its report.

4) TF Continuous Revisions to C57.12.00

T. Ansari

- Discussion on adding an informational note in section 7.1.2 for Table 11, "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."

- Motion of adding for table 11 is informational note. by T. Ansari, seconded by D. Sauer. The motion passed with unanimous approval.
- Discussion on modifying the notes in table 17 for the load loss on Min and Max tap of distribution transformer to add the statement “ For Class II power transformers”
- Motion 2 by T. Ansari, seconded by D. Sauer. The motion passed with unanimous approval

5) WG Standard for DPV Transformers C57.159

H. Shertukde

- P. Hopkinson presented a NEMA document on transformers connected to inverters and the effects on the transformer design to achieve reliable operation. The presentation and discussion used most of the meeting. The main points are a) for a Wye secondary avoid grounding the neutral, if possible, to avoid ground loops, b) if the neutral is grounded it is advised to install a shield between the core and LV winding to prevent core partial discharge and gassing. There are some configurations (Delta LV, some core types) where these precautions might not be necessary.
- Discussion if batteries connected to inverters and other new applications of inverters and new inverter types should be included in the Scope. Chair said that the PAR change this would require would take too much time. These other applications could be included in an informative annex.

6) TF on PCS Continuous Revisions to Test Code C57.12.90

H. Sahin

- Meeting started on time. 117 individuals attended the meeting. 42/59 members were present, quorum was achieved.
- The TF continued to work on clause 5.1, “Determination of cold temperature, under Clause 5: Resistance measurements” to improve the clause to define a better method/process and understanding rather than the current statement, which is “ The cold temperature of the winding shall be determined as accurately as possible when measuring the cold Resistance”. TF agreed to form a small group of experienced members to work on this off-line and come to the next meeting with the proposal. The group was formed.
- TF reviewed the new business request to re-look at the location of clause 10.5.1 within the standard. TF agreed that this belongs under the Di-electrics SC and the new business is handed over to the TF Cont. Revision to low frequency tests C57.12.90 – DiTests
- TF reviewed another possible new business which is related to the % current applied during load loss and impedance tests. Chair agreed to consider this as new business and will be discussed during the next meeting.

6) WG Switching Transients Ind by Xfmr/Bkr Interaction PC57.142

J. McBride

- Circulation of Attendance Sheets 35 of 44 Members were present, quorum was achieved.
- Approval of Agenda and Minutes from Fall 2024 Meeting
- C57.142 Ballot status and Comment Resolution
- Total Comments 306 (Editorial Required 107; Editorial Not Required 109)

- Technical Required 67; Technical Not Required 22)
- Addressed Comments: 306; All Comments Addressed
- Draft 13 has been completed and incorporates all the 306 addressed comments.
- Recirculation will begin as soon as CRG approves. The CRG has members from both the Transformers and Switchgear Committees.
- Mitigation Methods Task Force Update The task force will be presenting a tutorial on mitigation methods at the Fall meeting

7) **WG Guide for Application of Tertiary & Stabilizing Windings C57.158** **E. Betancourt**

- The TF achieved a quorum 11 Guests requested membership.
- TF1 “Editorial and technical corrections and enhancements to existing document” completed its work. Most changes already included in Draft 1A, already circulated among membership.
- TF2 “Further recommendations for transformers without a delta winding” also finished discussions, preparing final text to be included in Draft 2 of the Guide.
- TF3 “Enhanced topics: Loading of Multiwinding Trs. and Other”, finished work and will send text for incorporation in Draft 2.
- TF4 “New special topics” with work still in progress.
- Motion 1, unanimously Approved: “The Chair will circulate Draft 2 of the Guide for a ‘straw ballot’ before the next, F’25 meeting of the Group”.
- If comments could be resolved by the F’25 meeting, the document would be ready for MEC review early 2026.

8) **WG IEEE Neutral Grounding Devices PC57.32** **S. Kennedy**

- Approval of Agenda and Approval of Minutes from previous Meeting
- Clause 4 completed all main body section draft work and SPAR Annex is complete.
- David Caverly presented the SPAR annex.
- Camilo will send a slightly revised document after the meeting.
- Clause 5 - Neutral Ground Fault Neutralizers, completed all main body work, “Failed Phase Grounding” Annex and “Residual Current Compensator” Annex is complete.
- Clause 6 - Neutral Grounding Transformers. all work is complete.
- Clause 7 - Neutral Grounding Resistors. All work is complete.
- Clause 8 - Combination Devices. Still need a method for calculating impedance of single phase transformers and/or zigzags. Sergio will add this to the main body draft and send shortly to the Chair.
- Working Group Survey will go out as soon as these couple items are finished
- An overall draft will be prepared and sent out to the working group before the next meeting for survey.

9) **WG Entity HVDC Neutral Grounding Devices PC57.32.10** **Z. Hua**

- Approved by SA

10) WG Entity Winding Deformation Guide PC57.141

X. Shao (P. Patel)

- The Draft 7.0 of IEEE PC57.141 - Guide for Detection, Monitoring, and Evaluation of Winding Deformation in Liquid-Immersed Power Transformers, has been completed and the WG has reached a consensus on moving forward to the SA ballot
- P. Patel makes motion to take C57.141 - Guide for Detection, Monitoring, and Evaluation of Winding Deformation in Liquid-Immersed Power Transformers to initiate balloting. D. Sauer seconds. The motion passed with unanimous approval

11) PAR Study Group C57.120

R. Verdolin (K.Ziebert)

- Approved title, scope and purpose as well as a motion to move forward with a PAR for revision of the document
- K. Ziebert made motion for PAR revision for C57.120. D. Sauers seconded. The motion passed with unanimous approval.

J.6 Unfinished (Old) Business

There was no unfinished business.

J.7 New Business

- EPM – P0161
 - Project Title: Recommended Practice for Testing the Impact of Harmonic Distortion on the Transformers of a nominal voltage of 10kV and less
 - Scope of the proposed standard: The scope of this guide is testing related to the impact of harmonic distortion on transformers with respect to energy consumption. It includes how to specify the testing procedures, how to standardize type tests, describes parameters and layout of testing equipment, clarifies how to conduct testing effectively, recommends testing processes, how to report test results, and specifies what content conclusions should be included in the testing report.

S. Kennedy makes motion for committee to accept oversight on this proposal. Seconded by D. Sauer. The motion passed with unanimous approval

- P. Hopkinson proposed creation of a task force for IEC/IEEE 60076-16 to open up a PAR. S. Debass was assigned chair for this TF to prepare the PAR.
- S. Som created task forces for C57.109 (Chair S. Hoffman) and C57.110 (Chair A. Narawane) to prepare the PAR.

J.8 Adjournment

- The meeting was adjourned at 4:04 PM

J.9 Minutes of Meetings of Working Group (WG) and Task Force (TF) Reports (all unapproved)

J.9.1 WG Eval Guide Environ Impact of Trans & Reactors PC57.151

J. Kazmierczak

Technical Activity Reports

IEEE Guide for the Evaluation of the environmental impact & life cycle assessment of Transformers & Shunt Reactors

2025 Spring Meeting, Hyatt Regency Denver; Denver, Colorado, USA

Monday, March 24, 2025 – 11:00 AM to 12:15 PM Mountain Time

Chair

Vice Chair

Secretary

J. Kazmierczak
Hitachi Energy

Ismail Guner
Hydro Quebec

Elise Arnold
SGB-SMIT Group

- This is the second meeting of the guide
- A call to order was made at 11:00 AM
- The patent & copyright policy was reviewed. A call for any patents was made. There were two patents that were previously declared & clarified.
- Quorum was taken. There were 78 attendees total with 36 being members. Thirty seven members were needed to achieve quorum. Therefore, quorum was not achieved
- The Agenda was presented, but couldn't be approved due to lack of quorum.
- Approval of MoM's from St. Louis could not be approved due to lack of quorum.
- Mike Nolte with Kewitt presented section 3 outline, as this is the initial section that will drive the rest of the guide
- John Sen, Duke Energy, asked about low loss design aspects, suggested just listing losses.
- Luiz Chem, Hitachi Energy, suggested having additional focus of operation (loading) & maintenance. Also would consider the strategy to have spares, etc.
- Valentina Valori, Hitachi Energy, suggested to show/compare both concepts of cradle to gate vs. cradle to grave
- Sethi Kabir, Hitachi Energy, asked if we will include alternative liquids as well.
- Hitachi Energy if we consider in the LCA the loading profile
- Valentina Valori, Hitachi Energy, why is noise level included in the LCA?
- Christoph Ploetner, Siemens Energy, the guide must be equally applicable for everyone
- John Sen, Duke Energy, how will this agenda be allocated to work on?

- Jonathon Tan, Northern Tx, the design aspects included are interesting & relevant. We need to make sure we can also look at heat & noise emissions, as the guide's title does reference environmental impacts as well as LCA.
- Paul Wench, Schneider Electric, happy to be included in scoping piece.
- Luka Kovacic, Koncar, regarding the losses & noise level it is not the LCA basis to look at heat or noise emissions, but to look at it from CO2 emissions.
- Hongzhi Zhang, Hitachi Energy, need to also mention the heating/cooling of the tx. (temp rise).
- Francis Mills, other aspects should be included in the design aspects (thermal capability, dielectric capability, losses, noise, etc.)
- Emil Kricic, Hitachi Energy, will it be realted only to Tx. & Reactor or will this be extended to other aspects, such as substations (i.e. alternative liquids allow for smaller substation footprint). Also, use sensitivity calculation for loading, evaluate the effect at different loading points
- Poorvi Patel, EPRI, the detailed discussions should be had in the task forces.
- John Sen, Duke Energy, use design optimization as a title, with the sections listed as losses, noise, etc. instead of using low.
- Jonathon Tan, Northern Tx., also volunteered to work on section 3.
- New business was covered, as per the agenda, no new business was offered.
- John Sen, Duke Energy, motioned to dismiss & Markus Schiessl (SGB) seconded.

IEEE/PES Transformers Committee Roster

**IEEE GUIDE FOR THE EVALUATION OF THE ENVIRONMENTAL IMPACT
& LIFE CYCLE ASSESSMENT OF TRANSFORMERS & SHUNT REACTORS**
MEETing Location: Fall 2024 – St. Louis, Missouri, USA 11 :00AM-12 :15AM CST
date: October 28, 2024

	Last Name	First Name	Company (Affiliation)	Role
1.	Giraldo	Orlando	The HJ Family of Companies	Member
2.	Munoz	Marta	Hitachi energy	Member

	Last Name	First Name	Company (Affiliation)	Role
3.	Tenyenhuis	Ed	Hitachi Energy	Member
4.	Matthews	Lee	Howard Industries	Member
5.	Tan	Jonathan	Northern Transformer	Member
6.	Greaves	Brad	Weidmann Electrical Technology	Member
7.	Hossain	Saif	Trench Canada	Member
8.	Rehkopf	Sebastian	Reinhausen Germany	Member
9.	Ploetner	Chris	Siemens Energy	Guest
10.	Foata	Marc	MR	Guest
11.	Boettger	William	Boettger Transformer Consulting LLC	Member
12.	Mahajan	Kushal	Sungrow	Member
13.	Schiessl	Markus	SGB	Member
14.	Dillon	Nikolaus	Dominion Energy	Member
15.	Sharp	Michael	Trench Limited	Member
16.	Bhardwaj	Naveen	Trench Group	Member
17.	Calil	Wilerson	Hitachi Energy	Member
18.	Kapka	Sergiusz	Hitachi Energy	Guest
19.	Kowalski	Rafal	Hitachi Energy	Member
20.	Casallas	Camilo	Trench	Member

	Last Name	First Name	Company (Affiliation)	Role
21.	Sen	John	Duke Energy	Member
22.	Garcia	Miguel	Hitachi Energy	Member
23.	Nolte	Michael	Kiewit	Member
24.	Dorpmanns	Luc	Royal SMIT Transformers	Member
25.	Schrammel	Alfons	Siemens Energy	Member
26.	Thomas	Scott	Hitachi Energy	Guest
27.	Patel	Rakesh	Hitachi Energy	Member
28.	Weyandt	Paul	Schneider Electric	Member
29.	Patel	Poorvi	EPRI	Member
30.	Gustavsson	Niklas	Hitachi Energy	Member
31.	Labh	Ashwini	Hitachi Energy	Member
32.	Cheim	Luiz	Hitachi Energy	Member
33.	Mills	Francis	Power Engineers Inc.	Member
34.	Luka	Kovacic	Koncar Instrument Transformers	Member
35.	Gamboa	Jose	The H-J Family of Companies	Guest
36.	Post	Nicholas	WEC Energy Group	Guest
37.	Vir	Dharam	Prolec GE Waukesha	Member
38.	Steele	Hampton (Allen)	TVA	Member

	Last Name	First Name	Company (Affiliation)	Role
39.	Bernesjo	Mats	Hitachi Energy	Guest (Requests Membership)
40.	Taylor	Marc	JFE Shoji Canada	Member
41.	Som	Sanjib	PTT, LLC	Member
42.	Cordova	Olivia	Bureau of Reclamation	Guest
43.	Robles	Antonia	Bureau of Reclamation	Guest
44.	Digby	Scott	Duke Energy	Guest
45.	Kennedy	Sheldon	Sheldon R. Kennedy Engineering	Guest
46.	Loiselle	Luc	Tetrattech	Guest
47.	Hamoir	Didier	Transformer Protector Corporation	Guest
48.	Hrkac	Miljenko	HE	Guest
49.	Zhang	Hongzhi	Hitachi Energy	Guest (Requests Membership)
50.	Klempner	Dmitriy	Southern California Edison	Guest
51.	Chiang	Solomon	TGC	Guest
52.	Mai	Tim-Felix	Siemens Energy	Guest
53.	Lopez	Libando	Hitachi Energy	Guest
54.	Brzoznowski	Steven	BPA	Guest
55.	Ortiz	Juan	Reinhausen	Guest (Requests Membership)

	Last Name	First Name	Company (Affiliation)	Role
56.	Caverly	David	Trench Limited	Guest (Requests Membership)
57.	Blaszeayk	Piotr	Specialty Transformer Components	Guest (Requests Membership)
58.	Kulasek	Krzysztof	Delta Star Inc.	Guest
59.	Manzano	Moses	Hyosung HICO	Guest
60.	Urbirez	Orlando	JST Power	Guest (Requests Membership)
61.	Hampton	Kevin	Siemens Energy	Guest
62.	Faur	Florin	Prolec GE	Guest
63.	Rapelly	Layman	Georgia Transformer Corp.	Guest (Requests Membership)
64.	Da Silva	Roberto	MR	Guest
65.	Hipchen	John	Copper Development Association	Guest
66.	De Oliveira	Liuz	Hitachi Energy	Guest
67.	Sarkar	Amitabh	Virginia Transformer	Guest (Requests Membership)
68.	Martinez	Alberto	WEG	Guest (Requests Membership)
69.	Jones	Braxton	SD Myers	Guest
70.	Guinand	Benjamin	Power Magnetics	Guest
71.	Garner	Joshua	RESA Power	Guest
72.	Keels	Thomas	Keelectric Engineering	Guest

	Last Name	First Name	Company (Affiliation)	Role
73.	Montanha	Juliano	Siemens Energy	Guest
74.	Kriatushi	Mateuse	Hitachi Energy	Guest
75.	Sethi	Kabir	Hitachi Energy	Guest (Requests Membership)
76.	Valori	Valentina	Hitachi Energy	Guest
77.	Arnold	Elise	SGB SMIT	Officer - Secretary
78.	Kazmierczak	Jerzy	Hitachi Energy	Officer – Chair

J.9.2 TF Audible Sound Revision to Test Code

R. Girgis

Unapproved Minutes of Spring 2025 TF “Audible Sound Revision to Test Code” Meeting The TF met at 1:45 PM, on Monday, March 24, 2025. Dr. Ramsis Girgis, Chairman of the TF, presided over the meeting, with Mats Bernesjo being the Secretary.

The Chairman & Secretary welcomed the audience to this meeting and reviewed the proposed agenda. The proposed agenda was unanimously approved as was the unapproved minutes of the Fall 2024 TF meeting in Saint Louis (Eduardo Garcia 1st, David Wallach 2nd).

The TF meeting was attended by 34 out of 68 members and a total meeting attendance of 89 . A quorum was not established. 19 attendees requested membership at this meeting (listed below) **.

First, the chairman gave a follow up to the 2 action items from the St. Louis TF meeting, namely:

1. Putting together a proposed addition to the IEEE Noise Guide that includes a procedure for determining the maximum allowed sound pressure of Preventive Autotransformers (PAs) in air to limit the impact of the PA noise on the Sound Pressure level of the main transformer to 1 dB. A draft of this proposed addition is completed, and the outline of this addition was presented later in this meeting.
2. An IEEE PES conference paper on this topic was submitted and was accepted for presentation at the upcoming IEEE PES general meeting in Austin, TX in July.

The chairman then presented cases previously presented on impact of PA noise on power transformers at FAT and on site. This is followed by a presentation by Mr. Scott Digby of Duke Energy gave presentation on some of the experience that Duke Energy have had with noisy PAs and how these required un-tanking of Power transformers and replacing the PAs.

The Chairman then presented a summary of present practice of different power Transformers manufacturers of defining their PA noise requirements. Some of these requirements indicated very conservative limits on PA sound levels and hence non-optimized designs.

Next, the Chairman presented the outline of the proposed addition to the IEEE Noise Guide which included:

1. The proposed procedure for determining the required Sound pressure level of PAs in air such that the PA noise does not increase the Sound Pressure Level of the main Transformer by more than 1 dB at the bridging Tap Positions.
2. A numerical example of this procedure
3. Suggested methodology to measure the Sound Pressure level of PAs in air.

Mr. Fernando Leal of Prolec – GE, Mexico, stated that his factory tested 94 PAs and that 90 % of the data deviated from sound levels calculated using the proposed formula for determining the maximum allowed sound pressure of Preventive Autotransformers (PAs) in air. Fernando requested that his data be presented to the Task Force for further discussion of the proposed procedure. The Chairman stated that he will try to get more clarification from Fernando on his data and will respond to him upon receiving this clarification and will share the response with all who attended the TF meeting. Also, he agreed to present the results of the analysis of Fernando's data at the fall meeting of the TF.

Mr. Dumitru Diaconu stated that, in some cases, the PA noise was thought to have been amplified by mechanical resonance of the tank. The Chairman responded that this could happen in some cases. The proposed addition would not cover such special incidents.

In response to a suggestion by Mr. Jason Varnell, the Chairman suggested that he will email a draft of the proposed text of the addition to the IEEE noise Guide to those who attended the TF meeting and will ask for feedback, with the plan to share the feedback with participants of the fall TF meeting and possibly vote for the inclusion of this addition to the IEEE noise Guide. A number of TF members agreed with that plan.

Finally, the chairman stated that the presentation given at the TF meeting will be shared with the attendees of this meeting along with the unapproved minutes of the meeting.

With no new additional business raised, the meeting was adjourned upon unanimous approval

Respectfully submitted,

Mats Bernesjo, TF Secretary

** Attendees requested membership

Alfredo Carrizales (Prolec), Steven Brzoznowski (BPA), Cuauhtemoc Ortiz (Niagara Power Transformer Corp), Dumitru Diaconu (Delta Star), Fei Yang (Hitachi Energy), Ion Radu (Hitachi Energy), Jason Varnell (Doble Engineering), Jesus Marcelino Perez (Prolec), Jesus Sanchez Rodriguez (Vertiv), John John (Virginia Transformer), Josh Bohrn (PacifiCorp), Kabir Sethi (Hitachi Energy Germany AG), Moses Manzano (Hyosung HICO), Naveen Bhardwaj (Trench group), Nihat Kosedagi (ERMCO), Nitesh Patel (Hyundai Power Transformers), Qasim Khan (Neetrac Georgia Tech), Vijay Gunja (Powertechlabs), Wilerson Calil (Hitachi Energy)

2025 Spring Meeting Attendance and Affiliation is as follows:

Name	Affiliation	Involvement Level
Ajith Varghese	Prolec GE Waukesha	Voting Member
Alberto Martinez	WEG	Observer
Alfredo Carrizales	Prolec	Request Membership

Andy Steineman	Delta Star, Inc.	Observer
Armino santos	Prolec	Observer
Bilal Maksoud	Delta Star inc.	Voting Member
Brzoznowski Steven	BPA	Voting Member
Christopher Slattery	FirstEnergy	Voting Member
Cuauhtemoc Ortiz	Niagara Power Transformer Corp	Request Membership
Dal Ho Kim	Iljin electric	Observer
Daniel Sauer	Eaton	Voting Member
Darren Brown	Howard Industries	Observer
David Caverly	Trench Limited	Observer
David Wallach	Duke Energy	Observer
Diego Galvez	HICO America	Observer
Dinesh Sankarakurup	Duke Energy	Voting Member
Dumitru Diaconu	Delta Star	Request Membership
Duvier Bedoya	Hitachi Energy	Voting Member
Eduardo Garcia	Siemens Energy	Voting Member
Elise Arnold	SGB	Voting Member
Enrique Betancourt	Prolec GE	Voting Member
Fei Yang	Hitachi Energy	Request Membership
Fernando Leal	PROLEC GE	Voting Member
Francis	Mills	Voting Member
Frank Neder	Trench Group	Observer
Gilberto Garza	Prolec	Observer
Hakan Sahin	Virginia Transformer	Voting Member
Hugo Flores	Ermco	Voting Member
Hyounggon Ryu	HD Hyundai electric	Observer
Ion Radu	Hitachi Energy	Request Membership
Jaeyong Park	LS Electric	Observer
James Norton	Oncor	Observer
Janusz Szczechowski	Maschinenfabrik Reinhausen GmbH	Observer
Jason Varnell	Doble Engineering	Request Membership
Jeffrey Wright	Duquesne Light	Observer
Jerzy Kazmierczak	Hitachi Energy	Voting Member
Jesus Marcelino Perez	Prolec	Request Membership
Jesus Sanchez Rodriguez	Vertiv	Request Membership

Joe Nims	Allen & Hoshall	Observer
John John	Virginia Transformer	Request Membership
John Sen	Duke Energy	Voting Member
Josh Bohrn	PacifiCorp	Request Membership
Josipa Brekalo	Koncar D&ST	Observer
Juan Reyes Perez	Hitachi Energy	Observer
Juliano Montanha	Siemens Energy	Observer
Kabir Sethi	Hitachi Energy Germany AG	Request Membership
Kayland Adams	Prolec-GE Waukesha	Voting Member
Klaus Pointner	Trench Austria GmbH	Voting Member
Kris Zibert	Allgeier Martin	Voting Member
Kyungchan An	HYOSUNG	Observer
Marc Taylor	JFE Shoji Power Canada	Voting Member
Mark Lachman	Doble	Voting Member
Markus Schiessl	SGB	Voting Member
Marta Munoz	Hitachi Energy	Voting Member
Matija Koprivnjak	Končar D&ST	Observer
Mats Bernesjo	Hitachi Energy	Voting Member
Michael Botti	Hyosung HICO	Observer
Michael Sharp	Trench Limited	Voting Member
Moses Manzano	Hyosung HICO	Request Membership
Naveen Bhardwaj	Trench Group	Request Membership
Nicholas Koinis	CenterPoint Energy	Observer
Nick Jensen	Delta Star	Voting Member
Nihat Kosedagi	ERMCO	Request Membership
Nitesh Patel	Hyundai Power Transformers	Request membership
Onome Avanoma	MJ Consulting	Voting Member
Pedro Trujillo	Hyundai	Observer
Peter Dopplmair	Trench Group	Observer
Qasim Khan	Neetrac-Georgia Tech	Request Membership
Rafal Kowalski	Hitachi Energy	Voting Member
Ramsis Girgis	Hitachi Energy	Voting Member
Raymond Frazier	Ameren	Observer
Sanjib Som	Quantas Services	Voting Member
Sanjib Som	Pennsylvania Transformers	Voting Member

Scott	Dennis	Voting Member
Scott Digby	Duke Energy	Voting Member
Shawn Gossett	Ameren Illinois	Observer
Stefan Wirth	Coil Innovation GMBH	Observer
Steven Brzoznowski	BPA	Request Membership
Sukin Jang	ILJIN Electric	Observer
Troy Tanaka	Burns & McDonnell	Observer
Vijay Gunja	Powertechlabs	Observer
Vivian Chan	Hitachi energy	Observer
Wilerson Calil	Hitachi Energy	Request Membership
William Boettger	Boettger Transformer Consulting LLC	Voting Member
William Griesacker	WGA	Observer
Xose Lopez-Fernandez	Universidad de Vigo	Observer

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J.9.3 TF PCS Continuous Revisions to C57.12.00

T. Ansari

PCS Task Force on General Requirements C57.12.00

Performance Characteristics Subcommittee

IEEE / PES Transformers Committee

March 24, 2025

Denver, Colorado

UNAPPROVED MINUTES

The PCS Task Force on General Requirements for C57.12.00 met at 3:15 PM on Monday, March 24, 2025. Chairman Tauhid Ansari presided over the meeting together with Vice Chair Enrique Betancourt and Mats Bernesjo being the secretary. The meeting was called to order and the Chairman reminded the group of the purpose and scope of this Task Force. The copyright and patent statements from IEEE were presented to the group; none of the members and guests present were aware of any issues related to this TF's activities.

The meeting was attended by 41 voting members (out of 65), 63 observers, for a total meeting attendance of 106 people, including 22 requests for membership at this meeting. A quorum was established with $42 / 65 = 65\%$ attendance.

The agenda was unanimously approved (1st Hugo Flores, 2nd Dan Sauer). The unapproved minutes from the previous meeting (Fall meeting, Saint Louis, 2024) was unanimously approved (1st Hugo Flores, 2nd Amitabh Sarkar).

The following 22 guests requested membership:

Alfredo Carrizales (Prolec), Arvind Kumar (Delta star inc), Steven Brzoznowski (BPA), Cuauhtemoc Ortiz (Niagara Power Transformer Corp), Dumitru Diaconu (Delta Star inc), Duvier Bedoya (Hitachi Energy), Fernando Leal (Prolec GE), Jonathan Tan (Northern Transformer), Juan Velasquez (Magnetron sas), Juliano Montanha (Siemens Energy), Kannan Veeran (Virginia/ Georgia Transformer corp), Michael Botti (Hyosung HICO), Miguel Plascencia (Pacific Gas & Electric), Monil Patel (Pacific Gas and Electric), Nick Jensen (Delta Star), Nitesh Patel (Hyundai Power Transformers), Scott Dennis (Hitachi Energy), Waldemar Ziomek (PTI Transformers LP), Alberto Martinez (WEG), Fei Yang (Hitachi Energy), Alery Palhatija (Virginia Transformers), and John Trantum (Siemens Energy)

Next, the Chair briefly provided background and relevance of each item brought up for Group's discussion in the agenda. The Chair started Group's regular business.

WG Item 115, Adding Sec 4.1.10 on DC current injection limits – Andrew Larison

Mr. Larison brought back the discussion on adding DC current injection limits to C57.12.00. A question was brought up whether the Distribution Transformer Standards Committee would accept this request as it does not necessarily belong to C57.12.00. Again, it is not fully clear what the basis is for the 0.5 % current limit, whether it is of the Base KVA rating, the Top KVA rating, etc. It was decided / requested that this item is brought up with the Distribution Transformer Standards Committee for further action.

WG Item 116, Update of KVA Levels in Table 11 – Ryan Hogg

Mr. Hogg gave an update of the history of Table 11 after some additional findings. He proposed to add a note to C57.12.00 "Note: The kVA values for single-phase and three-phase transformers 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."

A vote within the WG to add the above note resulted in 27 approve and 1 abstain. Hence, the proposed write up will be added as an INFORMAL note in the body of the text (not normative).

WG Item 119 – Load loss on Min and Max tap of Distribution transformers – Andrew Larison

Prior to the meeting, Mr. Larison sent a suggestion to the WG with a proposal to add additional tests to the table for Class II Power Transformers (excluding DTR and Class I transformers from these requirements). A short discussion leading up to a motion was held before the motion was tabled by Mr. Sauer. The following discussion focused on improving the terminology some to better clarify the intent. The bottom line that was agreed upon was to modify the text marked in yellow to start with “For Class II Power Transformers, followed by the remainder of the text ending with ...KVA rating. A full stop and line break will follow this sentence. Dan Blaydon motioned to go with this text, seconded by Hugo Flores.

Impedance voltage and load loss at rated current and rated frequency on the rated voltage connection, and at the tap extremes of the first unit of a new design	*			*			*			These measurements shall be taken only at the rated voltage connection for a two-winding unit, and at all rated voltage connections for units with three or more windings. At least one test shall be performed at the minimum kVA rating and one test at the maximum kVA rating. The tested load loss of duplicate transformers shall be corrected to reference temperature by assuming the same stray and eddy loss as the design test transformer. For LTC units, see 8.3.2.

A vote was held whether to accept the new write up as proposed above was held. No objections nor abstain. Hence, the motion passed unanimously.

With a quiet floor, the Chairman asked for the meeting to be adjourned (1st Hugo Flores, 2nd by Sanjib Som).

Meeting was adjourned at 4:00 PM.

Respectfully submitted,

Tauhid Ansari
Chair

Enrique Betancourt
Vice-Chair

Mats Bernesjo
Secretary

Attendance Spring 2025 Meeting – PCS TF to Revision C57.12.00

Name	Affiliation	Involvement Level
Adriana Cisco Sullberg	Salt River Project	Observer
Ajith Varghese	Prolec GE Waukesha	Voting Member
Alain Bolliger	HV TECHNOLOGIES Inc	Observer
Alan Washburn	Burns & McDonnell	Observer
Alfredo Carrizales	Prolec	Request Membership
Amitabh Sarkar	Virginia Transformer Corporation	Voting Member
Andreas Thiede	HIGHVOLT Dresden	Observer

Andrew Larison	Hitachi Energy	Observer
Anton Koshel	Delta Star, Inc.	Observer
Aparna Vedantham	Virginia transformer corporation	Voting Member
Armando Santos	Prolec	Observer
Arvind kumar	Delta star inc	Request Membership
Balaji	Virginia transformer	Observer
Bertrand Poulin	Hitachi Energy	Voting Member
Bilal Maksoud	Delta star inc	Observer
Brzoznowski Steven	BPA	Request Membership
Chanmin Jeong	HD Hyundai	Observer
Christopher Slattery	FirstEnergy	Voting Member
Cihangir Sen	Duke Energy	Voting Member
Cuauhtemoc Ortiz	Niagara Power Transformer Corp	Request Membership
Dal Ho Kim	Iljin electric	Observer
Daniel Blaydon	Baltimore Gas and Electric	Voting Member
Daniel Sauer	Eaton	Voting Member
Darren Brown	Howard Industries	Voting Member
David Calitz	Siemens Energy	Observer
David Wallach	Duke Energy	Voting Member
Dinesh Sankarakurup	Duke Energy	Voting Member
Dominique Bolliger	HV TECHNOLOGIES, Inc.	Observer
Dumitru Diaconu	Delta Star inc	Request Membership
Duvier Bedoya	Hitachi Energy	Request Membership
Elise Arnold	SGB	Voting Member
Enrique Betancourt	Prolec GE	Voting Member
Eric Davis	Consultant	Voting Member
Fedor	SGB-Smit Group	Observer
Fernando leal	Prolec ge	Request Membership
Francis Mills	Power Engineer Inc.	Voting Member
Hakan Sahin	Virginia transformer	Voting Member
Hampton Steele	TVA	Observer
Harry Pepe	Phenix Technologies	Observer
Hugo Flores	Ermco	Voting Member
Isaac Abdalla	HICO America	Observer
Jason Varnell	Doble Engineering	Voting Member
Jeffrey Britton	Doble Engineering	Observer
Jeffrey Gragert	Xcel Energy	Observer

Joe Nims	Allen & Hoshall	Voting Member
Jonathan Reimer	FortisBC	Observer
Jonathan Tan	Northern Transformer	Request Membership
José Luis Machain	Prolec GE	Observer
Joshua Watson	NPPD	Observer
Juan Reyes	Hitachi Energy	Observer
Juan Velasquez	Magnetron sas	Request Membership
Juliano Montanha	Siemens Energy	Request Membership
Kannan Veeran	Virginia/ Georgia Transformer corp	Request Membership
Kris Neild	Megger	Voting Member
Landen Kwan	NRC	Observer
Luc Dorpmanns	Royal SMIT Transformers	Observer
Marc Taylor	JFE Shoji Power Canada	Observer
Markus Schiessl	SGB	Voting Member
Marnie Roussell	Entergy	Voting Member
Mats Bernesjo	Hitachi Energy	Voting Member
Matija Koprivnjak	Končar D&ST	Observer
Michael Botti	Hyosung HICO	Request Membership
Miguel Plascencia	Pacific Gas & Electric	Request Membership
Monil Patel	Pacific Gas and Electric	Request Membership
Moses Manzano	Hyosung HICO	Observer
Nick Jensen	Delta Star	Request Membership
Nikolaus Dillon	Dominion Energy	Voting Member
Nitesh Patel	Hyundai Power Transformers	Request Membership
Pedro Trujillo	Hyundai	Observer
Peter Heinzig	Weidmann	Observer
Rafał Kowalski	Hitachi Energy	Observer
Ramsis Girgis	Hitachi Energy	Voting Member
Sheila Ray	US Nuclear Regulatory Commission	Observer
Raymond Frazier	Ameren	Voting Member
Reto Fausch	RF Solutions	Observer
Rudolf Ogajanov	Hitachi Energy	Observer
Ryan Hogg	Bureau of Reclamation	Voting Member
Sanjay Patel	Royal Smit Transformers	Voting Member
Scott Dennis	Hitachi Energy	Request Membership
Shawn Gossett	Ameren Illinois	Voting Member
Sheldon Kennedy	Sheldon P Kennedy Engineering PLLC	Voting Member

Sanjib Som	PTT	Voting Member
Stephen Antosz	Consultant	Voting Member
Steven Snyder	Hitachi Energy	Voting Member
Sukin Jang	ILJIN Electric	Observer
Tauhid Ansari	Hitachi Energy	Voting Member
Vijay Gunja	Powertechlabs	Observer
Vinay Patel	Con Edison	Observer
Zan Kiparizoski	Howard industries	Voting Member
Waldemar Ziomek	PTI Transformers LP	Request Membership
Eduardo Garcia Wild	Siemens Energy	Voting Member
Marc Lachman	Doble	Voting Member
Sanjib Som	Pennsylvania Transformers	Voting Member
Kris Zibert	Allgeier, Martin and associates	Voting Member
Waldemar Ziomek	PTI Transformers LP	Observer
Matt Weisensee	Pacificorp	Observer
Gabriel Mamede	Siemens Energy	Observer
Joska Brekalu	Končar D&ST	Observer
Matija Koprivnjak	Končar D&ST	Observer
Samraghi Dutta Roy	Siemens Energy	Voting Member
Alberto Martinez	WEG	Request Membership
Ed teNyenhuis	Hitachi Energy	Voting Member
Fei Yang	Hitachi Energy	Request Membership
Laxman Rapelly	Georgia Transformer Corp	Observer
Ajay Palhatiya	Virginia Transformers	Request Membership
John Trantum	Siemens Energy	Request Membership

J.9.4 WG Standard for DPVTs C57.159

H. Shertukde

Performance Characteristics Subcommittee

Working Group C57.159: Standard for Distributed Photo-Voltaic Transformers (DPVTs)

Unapproved Meeting Minutes

**Spring 2025 Meeting
March 24, 2025, 4:45pm**

**Hyatt Regency Denver Centennial DE
Denver, Colorado**

The meeting was called to order at 4:51PM CDT by Vice-Chair, Phil Hopkinson. Chair Hem Shertukde was present, and David Walker as Secretary.

20 Members attended, and 38 guests. The WG has 29 total members, and ,thus, a quorum was achieved.

David Walker called for patents. None were mentioned.

Paul Weyandt moved to approve the agenda as written, Ed teNyenhuis seconded. Approval of Agenda unanimously passed.

Old Business:

Phil Hopkinson presented the document NEMA US 80042-2024, Product Guide for Transformers Connected to Inverters. This document has much detail about the considerations involved in successfully connecting transformers to inverters. The link to the NEMA site that allows purchasing this document is: <https://store accuristech.com/nema/searches/51735634>

Phil showed a schematic of a transformer connected to an inverter. The schematic would be the same regardless of if the transformer was connected to batteries or solar panels. The inverters used IGBTs for switching. The transformer is 600V Wye LV and 34.5kV Delta HV. The measured Line to Line current has no significant harmonics. The transformer neutral does not have a ground connection and, thus, there is no neutral ground current. In a second example, the schematic is the same as the first example except that the transformer Wye neutral is grounded. This forms a ground current loop with the inverter ground connection. The inverter has line-line and line-neutral filtering of internal noise. But it has no neutral-ground filtering. In this case the measured line currents and ground current have large harmonic components. Also, large ground currents and increased line currents (compared to the first example) are measured. Often, this causes the neutral bushing to burn up. Also, the noisy neutral current creates noise in the LV winding. This also produces noisy HV winding voltages increased in voltage by the turn ratio when compared to the LV. This has caused failure of many transformers in a solar site. Joe Watson asked what, if anything, would be different if the LV was delta and the HV was grounded Wye. Phil replied that this would be ok since there is no ground current connection to the LV winding. Hem pointed out that the delta would also circulate any 3rd harmonic currents and they wouldn't be present in the HV. Sheldon Kennedy pointed out that in C57.18.10 NO LV circuits ever have grounded Wye windings. In fact, the neutral is never brought out in a rectifier transformer. NFPA 70 (National Electric Code) shows windings with grounded neutrals.

The Commutation frequency of IGBTs in inverters in solar systems can be as high as 100kHz. Solar and wind typically are in the range of 3 to 6 kHz. Commutation voltage spikes are then coupled via the ground connection to the LV winding and capacitively coupled to the core. Simple calculations gave the outside sheets of the core rising to about 900V due to the coupled noise. With about 1000 sheets in the

core and about 25 V/turn in the windings gives about 0.025V per sheet in the absence of noise. However, these solar transformers have gassing with H₂, Acetylene, etc. being present. The 900V of noise gives about 0.9V per sheet which is about 2X the insulation strength of the core steel. So, this voltage breaks down the insulation on the core sheets and causes partial discharge within the core which causes gas generation. Experiments in conjunction with WEG added a grounded shield between the core and the LV winding. This stopped the core discharge because the shield prevents the noise voltage from reaching the core. Phil concluded that to make an inverter transformer that does not have gassing regardless of core type one should use a core shield. Luigi Vega from Hitachi tried to reproduce the experiment. He found that not only the capacitance to the core mattered but it also depends heavily on the conductivity of the core insulation. If the core insulation is poor (high conductivity) the noise will create core current but not voltage buildup and PD. Luigi found lower voltages than Phil's calculation. David Walker asked if in Luigi's case of high conductivity does a core shield help? Luigi feels that there are a lot of transformers that operate without gassing. Carlos Guytan said that stacked cores had more problems than wound cores due to better insulation in stacked cores and shields were not as necessary for wound cores. Phil said that the WEG units had stacked cores.

Alan Zhang said that floating the neutral on a unit with a three leg core versus a 4 or 5 leg core was more likely to heat the neutral. He did a test adding a voltage to the LV and saw discharge in the core. Only when the core insulation is > 1000 ohms.

New Business- Standard versus Guide

Sasha Levin said that this standard is the only photovoltaic standard. We have 2.5 years to complete the revision and that will last a long time. The technology is still evolving quickly and that we can address a lot of things, like battery energy storage, that weren't mentioned in the original document or the current PAR. We should consider including battery storage in the revision. Which would require change of title, scope, etc. of the PAR.

Hem said that we are now on Draft 4 which has contributed to this draft. Much remains to be completed. Maybe 60% of what was planned for the standard.

David Walker said that the document is still written like a guide and not a standard. That is more descriptive than prescriptive. Hem said that it would require a PAR change which is time consuming to keep the document a Guide instead of changing to a standard.

Paul Orr suggested that sections that are primarily guidance could be in an informative annex. Hem agreed that there can be normative and informative content in the document.

Sheldon Kennedy said that there was a potential entity PAR with China about measuring core voltages.

Ryan Hogg said that there will be units mentioned in this document will have effects on his document on reverse power flow,

Adjournment and Next Meeting:

The meeting was adjourned at 5:59 MDT.

The next meeting will be at the Transformers Committee Fall 2025 Meeting in Bonita Springs, Florida. If additional virtual meetings are scheduled before the Spring 2024 meeting all Working Group members and non-member attendees will be notified.

Attendees at the Spring 2025 Meeting

Full Name	Employer	Participation
Beaudoin, Jason	Weidmann Group	Member
Biggie, Kevin	Weidmann Group	Member
Boettger, William	Boettger Transformer Consulting	Guest
Britton, Jeffrey	Doble	Guest
Conneighton, Brian	Cleveland Cliffs	Guest
Cryer, Rich	Digital Grig	Guest
Delgado Zamora, Gabriel	Invenergy	Member
de Olivera, Luiz	Hitachi Energy	Guest
Dinh, Huan	Hitachi Energy	Member
Flores, Hugo	Ermco	Guest
Gamboa, Jose	H-J Industries	Member
Garza, Gilberto	Prolec	Member
Gaytan, Carlos	Prolec	Member
Hernandez, Giovanni	Virginia Transformer	Guest
Hopkinson, Phil	Hvolt, Inc	Vice Chair
Iman, Mike	mgm Transformer	Guest
Kennedy, Sheldon	Sheldon P Kennedy Engineering	Member
Kotbagi, Sanju	MGM Transformer	Guest
Labeau jr, Bernard	Consumers Energy	Guest
Larison, Andrew	Hitachi Energy	Member
Lee, Moonhee	Hammond Power Solutions	Guest
Levin, Aleksandr	Weidmann Group	Guest
Lewand, Lance	Doble Engineering	Guest
Lopes, Ricardo	Efacec	Guest
Lopez-Fernandez, Xose	Universidade de Vigo	Member
Mani, Kumar	Duke Energy	Member

Mantoan, Francis	Siemens Energy	Guest
Moore, Curtis	Digital Grid	Guest
Morgan, Tyler	Duke Energy	Guest
Murcia, Fredy	Siemens Energy	Guest
Murillo, Hugo	H-J Industries	Guest
Newbill, Mark	Hitachi Energy	Guest
Oakes, Stephen	WEG	Member
Orr, Paul	NEMA	Member
Parkinson, Dwight	Eaton	Member
Patel, Vinay	Commonwealth Edison	Guest
Pepe, Harry	Dobel	Guest
Peuc, Luca	Koncar Dst	Guest
Quinones, Manuel	GE Vernova	Guest
Rato, Nuno	Efacec	Guest
Rodriguez, Juan Carlos	Magnetron SAS	Guest
Schindler, Stefan	Reinhausen	Guest
Shalabi, Jaber	VanTran	Guest
Shertukde, Hemchandra	University of Hartford	Chair
som, sanjib	Pennsylvania Transformer	Guest
teNyenhuys, Ed	Hitachi Energy	Member
Tirado, Fernando	Prolec Energy	Guest
Torchia, Leonard	PSE&G	Guest
Velasquez, Juan David	Magnetron SAS	Guest
Villa, Hector	Ecuatran SA	Guest
Walker, David	MGM Transformers	Secretary
Webb, Bruce	Knoxville Utilities Board	Guest
Weiss, Zachery	WEG	Guest
Weyandt, Paul	Schneider Electric	Member
White, Joe	Power Engineers	Member
Yuan, Guang	Hitachi Energy	Guest
Zarnowski, Michael	Carte	Guest
Zhang, Alan	Hitachi Energi	Guest

J.9.5 PCS Task Force Continuous Revision to Test Code C57.12.90

H. Sahin

Chair: Hakan Sahin Vice-Chair: N/A

Secretary	<u>Adam Sewell</u>	Percent Complete	<u>95%</u>
Current Draft Being Worked On:	<u>N/A</u>	Dated:	<u>N/A</u>
PAR Expiration Date:	<u>N/A</u>		
Meeting Date:	<u>25 March 2025</u>	Time:	<u>9:30am – 10:45am</u>
Location:	<u>Denver, CO, USA</u>		
Attendance:	Members	44 of 59	
	Guests	80	
	(Guests Requesting Membership)	(34)	
	Total*	124	

* Attendance list for this meeting is shown at end of meeting minutes

Meeting Minutes / Significant Issues / Comments:

Meeting was called to order at 9:30am, March 25, 2025 at Hyatt Regency Denver.

1. Administrative

- a. IEEE Patent Policy and Call for Patents and IEEE SA Copyright Policy
 - i. No comments from group
- b. Review of Spring 2025 agenda
 - i. No comments from group
- c. Introductions of the attendees
 - i. Attendance was taken by QR Code sign-in...no paper attendance sheets were passed out. Due to time constraints, chair did not have each attendee announce their name/affiliation. Name/affiliation was announced as attendees spoke during the meeting.
- d. Updated membership review and count for quorum
 - i. 59 members were listed and 40 were counted as present by hand count. Based on the hand count, the chair announced there was QUORUM for this meeting.
 - ii. Attendance list after meeting completed showed 44 members attended.
 - iii. **Members are expected to attend and stay in the meeting so business can be conducted.**
 - iv. **Member requests should be sent to secretary – adamsewell@ieee.org**
- e. Approval Spring 2025 agenda

- i. MOTION-S.Som, 2nd-J.John
 - ii. No opposition to unanimous approval – MOTION APPROVED
 - f. Approval of Fall 2024 unapproved minutes
 - i. MOTION-D.Wallach, 2nd-J.John
 - ii. No opposition to unanimous approval – MOTION APPROVED
2. Old Business
- a. From Fall 2024 meeting, review of the recommended revision to Clause 5.1: Determination of cold temperature, under Clause 5: Resistance measurements

5.1 Determination of cold temperature

The cold temperature of the windings shall be determined ~~as accurately as possible when measuring the cold Resistance~~ *by using top liquid (What to do for conservator units?), top and bottom temperature probes or sensors, to determine top liquid and average liquid temperatures. If a temperature rise test is required on the subject transformer, same temperature probes shall be used to determine the liquid temperatures.* The precautions in 5.1.1, 5.1.2, and 5.1.3 shall be observed.

5.1.1 General

Cold-resistance measurements shall be made on a transformer only when the liquid or winding temperature is stable. The temperature is considered stable if the ~~top~~ *average* liquid temperature does not vary more than 2 °C in a 1 h period. *Define average??*

5.1.2 Transformer windings immersed in insulating liquid

The temperature of the windings shall be assumed to be the same as the average temperature of the insulating liquid, provided the following occurs:

- a) The windings have been under insulating liquid with no excitation and with no current in the windings for a minimum of 3 h for a transformer without pumps and for 1 h for transformer with pumps running before the cold resistance is measured.
- b) The temperature of the insulating liquid has stabilized, and the difference between top and bottom temperature does not exceed 5 °C.

- b. J.Varnell proposed suggested wording for the TF discussion on the winding resistance:
 - i. The cold temperature of the windings for class II transformers shall be determined by a thermocouple or suitable thermometer immersed directly in oil.
- c. Discussions were had about wording of cold temperature measurement and will be continued at Spring 2025 meeting –
 - i. MOTION to change 5.1 wording: For Class-I and distribution transformers, the temperature of the windings shall be measured as accurately as possible. The cold temperature of the windings for Class-II transformers shall be measured by a suitable temperature probe either directly immersed, or in a thermowell fully immersed in the transformer liquid.
 - 1. MOTION by D.Sauer, 2nd – S.Som
 - 2. After discussions, MOTION to table/kill made by D.Sauer, 2nd – H.Flores
 - 3. No opposition to unanimous approval of MOTION to table/kill – MOTION APPROVED

3. New Business

- a. Form a small group to review wording for section 5.1 Determination of cold temperature offline/between meetings.
 - i. Volunteers to propose/review Section 5.1 wording – T.Ansari, S.Antosz, H.Sahin, D.Sauer, A.Varghese, J.Varnell
- b. R.Musgrove brought up discussion about the location of clause 10.5.1 within the standard. TF agreed that this belongs under the Di-electrics SC and the new business is handed over to the TF Cont. Revision to low frequency tests C57.12.90 – DiTests
- c. TF reviewed another possible new business which is related to the % current applied during load loss and impedance tests. Chair agreed to consider this as new business and will be discussed during the next meeting.

4. Membership changes

- a. Officers will look at attendance and change TF membership status before next meeting.

5. Next meeting: October 21, 2025 at Fall 2025 Transformers Committee Meeting scheduled for October 19-23, 2025, Bonita Springs, FL, USA

6. Close of meeting

- a. Meeting adjourned at 10:45am

Submitted by: Hakan Sahin Date: 4/11/25_____

March 25, 2025 Meeting Attendance: (RM = Request Membership)

LAST NAME	FIRST NAME	COMPANY/AFFILIATION	Role
Adams	Kayland	Prolec-GE Waukesha	MEMBER
Alonso	Mario	Georgia Transformer	GUEST
Amin	Mihir	Eaton	GUEST-RM
Ansari	Tauhid	Hitachi Energy	MEMBER
Antosz	Stephen	Consultant	MEMBER
Arnold	Elise	SGB	MEMBER
Avanoma	Onome	MJ Consulting	GUEST-RM
Bargone	Gilles	FISO	MEMBER
Bedoya	Duvier	Hitachi	MEMBER
Blaydon	Daniel	Baltimore Gas and Electric	MEMBER
Boettger	William	Boettger Transformer Consulting LLC	MEMBER
Bolliger	Dominique	HV TECHNOLOGIES, Inc.	MEMBER
Bolliger	Alain	HV TECHNOLOGIES Inc	GUEST
Botti	Michael	Hyosung HICO	GUEST-RM
Bradshaw	Garrett	Howard Industries, Inc.	GUEST
Brekalo	Josipa	KONCAR D&ST	GUEST
Britton	Jeffrey	Doble Engineering	MEMBER
Brzoznowski	Steven	BPA	GUEST-RM
Calitz	David	Siemens Energy	GUEST-RM
Carrizales	Alfredo	Prolec GE	MEMBER
Cisco Sullberg	Adriana	Salt River Project	GUEST
Colopy	Craig	Retired from EATON	GUEST
Crockett	Janet	Fayetteville PWC	GUEST
Dappen	Tim	Cargill	GUEST-RM
Dennis	Scott	Hitachi Energy	MEMBER
Diaconu	Dumitru	Delta Star inc	GUEST
Dillon	Nikolaus	Dominion Energy	GUEST
Dorpmanns	Luc	Royal SMIT Transformers	GUEST
Duffy	Jesse	Nashville Electric Service	GUEST
Dutta Roy	Samragni	Siemens Energy Inc	MEMBER
Espitia	Egui	Reinhausen Manufacturing Inc	GUEST
Fausch	Reto	RF Solutions	GUEST-RM
Flores	Hugo	Ermco	MEMBER
Frazier	Raymond	Ameren	MEMBER
Garcia	Eduardo	Siemens Energy	GUEST
Girgis	Ramsis	Hitachi Energy	MEMBER
Gorzin	Alireza	Black & Veatch	MEMBER
Gossett	Shawn	Ameren	MEMBER
Griesacker	William	WGA	MEMBER
Heinzig	Peter	Weidmann	GUEST
Hernandez Decanini	Giovanni	Virginia Transformer Corp	MEMBER
Holfield	Thomas	Howard Industries	GUEST
Hrkac	Miljenko	Hitachi Energy	GUEST-RM
Iman	Mike	MGM Transformers	GUEST-RM
Jakob	Karl	Cargill	GUEST
Janakiraman	Balaji	Virginia Transformers	GUEST
Jang	Sukin	ILJIN Electric	GUEST
Jensen	Nick	Delta Star	GUEST-RM
John	John	Virginia Transformer Corp	MEMBER
Kadar	Laszlo	Laszlo & Associates	GUEST
Kennedy	Sheldon	Sheldon P Kennedy Engineering PLLC	GUEST
Khan	Qasim	NEETRAC Georgia tech	GUEST-RM
kim	dalho	iljin electric	GUEST
Kiparizoski	Zan	Howard Industries	GUEST
Koprivnjak	Matija	Koncar D&ST	GUEST
Kosedagi	Nihat	ERMCO	GUEST-RM
Kumar	Arvind	Delta star inc	GUEST-RM
LaBean Jr	Bernard	Consumers Energy Company	GUEST
Lachman	Mark	Doble	MEMBER
Leal	Fernando	Prolec ge	MEMBER
Lee	Moonhee	Hammond Power Solutions	MEMBER
Levin	Aleksandr	Weidmann	GUEST

LAST NAME	FIRST NAME	COMPANY/AFFILIATION	ROLE
Mahajan	Kushal	Sungrow	GUEST
Mamede	Gabriel	Siemens Energy	GUEST-RM
Martinez Mares	Alberto	WEG	GUEST-RM
McBride	Brian	Cargill	GUEST
McBride	Jim	JMX High Voltage	GUEST
Melle	Tom	MELLE	GUEST-RM
Mills	Francis	POWER Engineers	MEMBER
Montanha	Juliano	Siemens Energy	GUEST
Munoz	Marta	Hitachi Energy	GUEST-RM
Naderian	Ali	Potencia Partners	GUEST
Narawane	Aniruddha	Eaton	GUEST
Neild	Kris	Megger	MEMBER
Ortiz	Cuauhtemoc	Niagara Power Transformer Corp	GUEST-RM
Palhatiya	Ajay	Virginia Transformer	GUEST-RM
Pandya	Manan	Siemens Energy	GUEST-RM
Panesar	Parminder	Virginia Transformer Corp	GUEST-RM
Patel	Monil	PG&E	GUEST
Patel	Nitesh	Hyundai Power Transformers	GUEST-RM
Patel	Sanjay	Royal Smit Transformers	MEMBER
Patel	Dipeshkumar	Hyper solutions	GUEST-RM
Pepe	Harry	Phenix Technologies	MEMBER
PEREZ	MARCELINO	PROLEC	GUEST-RM
Poulin	Bertrand	Hitachi Energy	GUEST
Reyes perez	Juan	Hitachi energy	GUEST
Ronchi	Rodrigo	WEG Transformers México	GUEST
Ryu	Hyounggon	HD hyundai electric	GUEST
Sahin	Hakan	Georgia transformer	MEMBER
Santos	Armino	Prolec GE	GUEST
Sauer	Daniel	Eaton	MEMBER
Schiessl	Markus	SGB	MEMBER
Sethi	Kabir	Hitachi Energy Germany Ag	GUEST-RM
Sewell	Adam	Quality Switch	MEMBER
Shalabi	Jaber	Vantran Industries	GUEST-RM
Shannon	Michael	Rea Magnet Wire	GUEST-RM
Shertukde	Hemchandra	UHART-DDI	MEMBER
Slattery	Christopher	FirstEnergy	MEMBER
Smith	Jimmy	Howard Industries	GUEST
SOM	SANJIB	PTT, LLC	MEMBER
Stechschulte	Kyle	AEP	GUEST
Steele	Hampton	TVA	GUEST
Steineman	Andy	Delta Star, Inc.	GUEST
Tan	Jonathan	Northern Transformer	GUEST-RM
teNyenhuish	Ed	Hitachi Energy	MEMBER
Thiede	Andreas	HIGHVOLT Dresden	MEMBER
Thomas	Scott	Hitachi Energy	GUEST
Trujillo	Pedro	Hyundai	GUEST
Van Dree	Cole	American Transmission Company	MEMBER
Varghese	Ajith	Prolec GE Waukesha	MEMBER
Varnell	Jason	Doble Engineering	MEMBER
Veeran	Kannan	Virginia/Georgia Transformer	GUEST-RM
Villa	Hector	Ecuatran SA	GUEST
Vyas	Pragnesh	Cleveland Cliffs	MEMBER
Wagner	John	AEP	GUEST-RM
Wallach	David	Duke Energy	MEMBER
Watson	Joshia	NPPD	GUEST
Weyandt	Paul	Schneider Electric	GUEST-RM
White	Leon	Hedrich North America	GUEST
Yang	Fei	Hitachi Energy	GUEST-RM
Yuan	Guang	Hitachi energy	GUEST-RM
Zhang	Hongzhi	Hitachi Energy	GUEST-RM
Zibert	Kris	Allgeier Martin	MEMBER
Ziomek	Waldemar	PTI Transformers LP	MEMBER

MEETING MINUTES

IEEE / PES Transformers Committee

Performance Characteristics Subcommittee

**WG to Investigate the Interaction between Substation Transients
And Transformers in HV and EHV Applications and Revision of C57.142**

Denver, Colorado USA

Tuesday, March 25th, 2025

11:00 AM – 12:15 PM

Hyatt Regency - Centennial DE

Chairman – Jim McBride

Vice Chair – Xose Lopez-Fernandez

Secretary – Tom Melle

- 1) Welcome and Chair's Remarks (it was mentioned the WG paper can be found at <https://ieeexplore.ieee.org/document/9161400>)
- 2) Circulation of Attendance Sheets. Quorum was achieved with 36 of 44 Members present. Guest attendance was 77 for a total of 113 attendees.
- 3) IEEE Patent Policy Slides – no patent claims
- 4) Approval of Agenda and Minutes from Last Meeting: Fall 2024 Minutes (motion by Phil Hopkinson / 2nd by Eduardo Garcia Wild) and Spring 2025 Agenda (motion by Marnie Roussell / 2nd by Phil Hopkinson) unanimously approved.
- 5) Reminder that the WG PAR extension is through December 31, 2025.
- 6) C57.142 Ballot and Comment Resolution for Draft 13 – Jim McBride:

The Chair stated that all comments have been resolved and asked for a motion to recirculate the ballot (motion by Hemchandra Shertukde / 2nd by Amitabh Sarkar). Weijun Li mentioned that a vote was not mandatory; however, the motion was unanimously approved. The Chair showed the slide containing the members of the CRG.

During discussion a question from Phil Hopkinson, regarding resolution of the comment from Doug Edwards of the Switchgear Committee was asked: "Should we state the loading levels and chopping currents in the Guide?" The chair responded that this topic will be considered in future business.

Update from IEEE Switchgear Liaison Task Force to WG for Revision of C57.142 by David Caverly. The Switchgear Meeting will be held at the Wyndham Grand Orlando Resort Bonnet Creek (Orlando, Florida) from April 6 – 11, 2025. No Task Force work is planned for the meeting, as all comments are complete. Mr. Caverly mentioned the creation of CIGRE A3.42 (new brochure for transformer failures) that may be of interest to the WG for liaison opportunities.

7) Mitigation Methods Task Force Update – Jim McBride / Phil Hopkinson

The Chair presented the Mitigation Methods summary and a list of TF Members. A tutorial is scheduled for Fall 2025 TC Meetings.

The WG plans to have ongoing discussions regarding the challenges of high-magnitude, high-frequency transients. It should be noted there are few (if any) factory tests to simulate these occurrences.

8) New Business – the Chair mentioned many recent occurrences of failures of transformers connected to solar farms as a possible future topic for the guide.

9) Next Meeting (Bonita Springs, FL October 19-23, 2025)

10) Adjournment at 11:33 AM

Meeting Attendance:

Role	Last Name	First Name	Company
Chair	McBride	James	JMX High Voltage
Vice-Chair	Lopez-Fernandez	Xose	Universidade de Vigo
Secretary	Melle	Thomas	HIGHVOLT
Member	Betancourt	Enrique	Prolec GE
Member	Boettger	William	Boettger Transformer Consulting LLC
Member	Britton	Jeffrey	Phenix Technologies, Inc.
Member	Caverly	David	Trench Limited
Member	Espindola	Marco	Hitachi Energy
Member	Frazier	Raymond	Ameren
Member	Garcia Wild	Eduardo	Siemens Energy
Member	Heiden	Kyle	EATON Corporation
Member	Hernandez	Giovanni	Virginia Transfomer Corp.
Member	Hernandez	JC	Georgia Tech - NEETRAC
Member	Hoffman	Saramma	PPL Electric Utilities
Member	Hopkinson	Philip	HVOLT Inc.
Member	Hossain	Saif	Trench Limited
Member	John	John	Virginia Transformer Corp.
Member	Khan	Qasim	Georgia Tech - NEETRAC
Member	Kirchenmayer	Egon	Siemens Energy
Member	Lee	Moonhee	Hammond Power Solutions
Member	Li	Weijun	Braintree Electric Light Dept.
Member	Mani	Kumar	Duke Energy
Member	Montanha	Juliano	Siemens Energy
Member	Pepe	Harry	Phenix Technologies, Inc.
Member	Pointner	Klaus	Trench Austria GmbH
Member	Poulin	Bertrand	Hitachi Energy
Member	Ronchi	Rodrigo	WEG-Voltran
Member	Roussell	Marnie	Entergy
Member	Sarkar	Amitabh	Virginia Transformer Corp.
Member	Sharp	Michael	Trench Limited
Member	Tolcachir	Eduardo	TTE
Member	Varghese	Ajith	Prolec-GE-Waukesha
Member	Vir	Dharam	Prolec-GE Waukesha
Member	Yun	Joshua	Virginia Transformer Corp.

Member	Zhang	Shibao	PCORE Electric
Member	Ziomek	Waldemar	PTI Transformers
Guest	An	KYUNGCHAN	HYOSUNG
Guest	Arnold	Elise	SGB
Guest	Botti	Michael	Hyosung HICO
Guest	Bradshaw	Garrett	Howard Industries
Guest	Brodeur	Samuel	Hitachi
Guest	Calitz	David	Siemens Energy
Guest	Carrizales	Juan Alfredo	Prolec GE
Guest	Chan	Vivian	Hitachi Energy
Guest	Chorzepa	Jaroslav	ABB Inc
Guest	Czernorucki	Marcos	Hitachi Energy
Guest	de Oliveira	Luiz	Hitachi Energy
Guest	Duffy	Jesse	Nashville Electric Service
Guest	Feaster	Kyle	Xcel Energy
Guest	Fernandez	Miguel	BELD
Guest	Fujimori	Alan	Romagnole
Guest	Griesacker	Bill	WGA
Guest	Gunja	Vijay	Powertechlabs
Guest	Heinzig	Peter	Weidmann Electrical Technology
Guest	Hollrah	Derek	Burns & McDonnell
Guest	Iman	Mike	MGM Transformer Company
Guest	Janakiraman	Balaji	Virginia Transformer
Guest	Jarosz	Patrycia	IEEE SA
Guest	Juchem	Kevin	ABB AG
Guest	Kim	Yeounsoo	MEPPI
Guest	Klempner	Dmitriy	Southern California Edison
Guest	Koshel	Anton	Delta Star Inc
Guest	Kotbagi	Shrinivas	MGM Transformers
Guest	Kumar	Arvind	Delta Star Inc.
Guest	Leal	Fernando	Prolec GE
Guest	Levin	Aleksandr	Weidmann Electrical Technology
Guest	Lopes	Ricardo	Efacec Energia, SA

Guest	Martinez Mares	Alberto	WEG
Guest	Masoud	Nader	Central Moloney
Guest	Mills	Francis	POWER Engineers
Guest	Munoz	Marta	Hitachi Energy
Guest	Nambi	Shankar	Bechtel
Guest	Natale	Anthony	HICO America
Guest	Nims	Joe	Allen & Hoshall, Inc.
Guest	Panetta	Sergio	I-GARD Corp
Guest	<i>Parkinson</i>	<i>Dwight</i>	EATON Corporation
Guest	Patel	Nitesh	Hyundai Power Transformers USA
Guest	Patel	Monil	PG&E
Guest	Perez	Marcelino	PROLEC-GE
Guest	<i>Ploetner</i>	<i>Christoph</i>	Siemens Energy
Guest	Prevost	Tom	Weidmann
Guest	Raymond	Tim	Inductive Reasoning
Guest	Reimer	Jonathan	Fortis BC
Guest	Rossini	Yuri	Siemens Energy
Guest	Rutledge	Gris	GeVernova
Guest	Santos	Armando	Prolec GE
Guest	Saraf	Manish	Hammond Power Solutions
Guest	Sbravati	Alan	Hitachi Energy
Guest	Schiessl	Markus	SGB
Guest	Schleismann	Eric	Southern Company Services
Guest	Segovic	Dario	Koncar Power Transformers
Guest	Sethi	Kabir	Hitachi Energy
Guest	Shaikh	Salahuddin	Hitachi Energy
Guest	Shull	Stephen	BBC Electrical Service, Inc.
Guest	Snyder	Jason	FirstEnergy
Guest	Steckschulte	Kyle	American Electric Power
Guest	<i>Steele</i>	<i>Hampton</i>	Tennessee Valley Authority
Guest	<i>Steineman</i>	<i>Andrew</i>	Delta Star Inc.
Guest	Thiede	Andreas	HIGHVOLT Dresden
Guest	Torchia	Leonard	PSE&G
Guest	Trifunoski	Rusto	Trench

Guest	Trujillo	Pedro	Hyundai Power Transformers USA
Guest	Velasquez	Juan	Magnetron SAS
Guest	Wagner	John	AEP
Guest	Washburn	Alan	Burns & McDonnell
Guest	Watson	Joe	JD Watson & Associates
Guest	Watson	Joshua	Nebraska Public Power District
Guest	Weatherbee	Eric	PCORE Electric
Guest	Wong	Terry	Trench LTD
Guest	Xie	Jiahao	S&C Electric Company
Guest	Yeboah	Kwasi	GE Vernova
Guest	Yuan	Guang	Hitachi Energy
Guest	Zhou	Anna	JST Power

J.9.7 WG C57.158 Application Guide for Tertiary and Stabilizing Windings

E. Betancourt

*PCS Working Group Revision of Application Guide for Tertiary and Stabilizing Windings C57.158
Performance Characteristics Subcommittee IEEE / PES Transformers Committee
March 25, 2025 Denver, Colorado, US*

UNAPPROVED MINUTES

This group met on Tuesday March 25, 2025, at 4:45 PM in Denver, CO, US. The attendance record showed **80** people attended the meeting with **25** out of the **41** Members present; a quorum to conduct business was established.

The following **14** Guests requested Membership (to be awarded after consecutive attendance at two WG meetings):

Alberto Martinez* WEG
Alireza Gorzin* Black and Veatch
Anton Koshel* Delta Star
Belaji Jonakiramm Virginia Transformers
Fei Yang* Hitachi Energy
Garret Bradshaw Howard Industries
Geraldo Magela Junior Hitachi Energy
Hongzhi Zhang* Hitachi Energy
Libardo Lopez Hitachi Energy
Marcelino Perez Prolec GE
Michael Botti* Hyosung HICO
Orlando Giraldo* The HJ Family of Companies
Pedro Trujillo HD Hyundai

Wilerson Calil Hitachi Energy (*) To become WG Members after this meeting.
The officers were introduced as Enrique Betancourt Chair, Xose Lope-Fernandez Vice Chair, and Kayland Adams Secretary.

IEEE Patent slides were covered, no issues were brought up.
IEEE Copyright Policy slides were discussed, no issues were brought up.
Attendance was conducted and quorum was achieved. Agenda was presented. Motion unanimously passed to approve the agenda (Amitabh Sarkar, John K. John). The Minutes from the last meeting were also unanimously approved (Eduardo García, Sanjib Som).

1. OLD BUSINESS

A. Draft 1A, including revision items from TF1 and TF2

Updates by each task force were presented.

2. Task Force 1: General editorial overview

Emilio Morales-Cruz presented the findings. 92 comments were assembled. As a result of this group's discussions, new text was proposed and further incorporated to Draft 1A of the Guide.

Jason Varnell proposed to add new subclause for protection and monitoring of stabilizing windings based on current measurements. The Chair explained that although protection and relaying fall out of the scope of current document, discussion of the subject could be incorporated as part of the scope of TF4. Steve Antosz reviewed C57.12.70 for labeling of bushings with five windings. Two options were proposed, and the Group agreed that for the fourth and fifth windings, the "numeral, letter, numeral" designations could be more convenient (i.e. H, X, Y, 1Z, 2Z- terminals, each with three different phase tags: "1,2,3").

The Chair had shared Draft 1A with the Group before the meeting, and during the meeting he presented the several sections where additional wording was added, identifying new text in red colored font.

3. Task Force 2: Recommendations for Y-connected transformers without a delta connected winding.

Dr. Xose Lope-Fernandez presented work in this section. Text was added for monitoring techniques that will allow Y-Y transformers without a tertiary to operate with a certain level of unbalanced load.

Egon Kirchenmayer of Siemens Energy offered some discussion on this topic but was referring to text that was not under review by task force 2, as he was addressing a grounding situation that was outside the scope of the task force 2.

Anton Koshel of Delta Star also offered some discussion mentioning auto transformers and Y-Y connected transformers with both neutrals grounded. It was explained that the case fell outside the scope of task force 2.

A. Further Steps for TF3 and TF4

Task Force 3: Improvement and, or simplification of concepts in the Guide

Krzysztof Kulasek offered to finish his work in a few weeks after this WG's meeting; the Chair presented briefly the status of discussions within TF3. Topics that are under discussion within TF3 are simultaneous loading of LV and TV at different power factors, and recommendations to determine the load losses for these situations.

The topic of bushing placement of large transformers with tertiary windings and transformers with stabilizing windings that require temperature testing was not supported with sufficient experience data and would not be further pursued.

4. Task Force 4: New recommendations for TW or SW

No work has been done at this time but topics to be covered are

- Some experiences with collector transformers in Renewables Plants (solar, wind, batteries?). Tertiaries for axial-split, Y-connected LVs.
- Section of grounding of neutrals in Y-connected transformers. [Reference?]
- Caution for application of outermost Tertiaries: electrostatic voltage pick-up.
- Effects from Reverse Power Flow?
- Circulating currents in delta of single-phase banks.

The Chair offered to review the scope of this TF with WG Members knowledgeable on the subject, and in case no further interest could be confirmed, the proposal would be presented to the Group to exclude the subjects from this revision of the document.

A. Concepts on “Zero-Sequence” (Tutorial Part 2- just informative)

A short presentation was given by the Chair to further explain the topic of “Zero sequence currents and its effects on systems and transformers”. A circuit model was presented, as well as the role of neutral grounding on transferring zero-sequence currents from one to other side of a Y-connected transformer. The purpose of this tutorial material is just to cover the fundamentals necessary to understand the Guide's concepts.

B. Next Steps

Draft 1A of the document is in circulation among the Group's Membership. After this session and before the meeting of Fall 2025 the following is planned to take place, add comments from this meeting to draft 1A and TF3 proposed improvements. With the new information prepare Draft 2 and perform a straw ballot.

Motion 1 (Hugo Flores, Eduardo Garcia) “The Chair will circulate Draft 2 of the Guide for a ‘straw ballot’ among WG's Membership before the next, F'25 meeting of the Group”.

If comments could be resolved by the F'25 meeting, the new document would be released as Draft 3, potentially ready for MEC review by mid-2026.

5. NEW BUSINESS

No new business was brought up.

6. ADJOURN

Motion passed to adjourn. Sanjib Som made the motion, Eduardo Garcia seconded. The meeting was adjourned at 5:55 PM.

Respectfully
submitted,

Enrique Betancourt

Chairman

Dr. Xose Lopez-Fernandez

Co-Chair

Kayland
Adams

Secretary

Next Pages: Attendance List (Req. = Request):

Nr	Last Name	First Name	Affiliation	Status
1	Adams	Kayland	Prolec GE Waukesha	Member
2	An	KyungChan	HYOSUNG	Guest
3	Antosz	Stephen	Consultant	Member
4	Avanoma	Onome	MJ Consulting	Member
5	Betancourt	Enrique	Prolec GE	Member
6	Boettger	William	Boettger Transformer Consulting LLC	Member
7	Bohrn	Josh	PacifiCorp	Guest
8	Botti	Michael	Hyosung HICO	Req. Membership
9	Bradshaw	Garrett	Howard Industries, Inc.	Req. Membership
10	Brekalo	Josipa	Koncar D&ST	Guest
11	Brzoznowski	Steven	BPA	Guest
12	Calil	Wilerson	Hitachi Energy	Req. Membership
13	Calitz	David	Siemens-Energy	Guest
14	Chan	Vivian	Hitachi energy	Guest
15	Czernorucki	Marcos	Hitachi Energy	Guest
16	Diaconu	Dumitru	Delta Star Inc	Guest
17	Dillon	Nikolaus	Dominion Energy	Guest
18	Filip	Mikulecky	Koncar Power Transformers Ltd.	Guest

19	Frazier	Raymond	Ameren	Member
20	Fujimori	Alan	Romagnole	Guest
21	Garcia	Eduardo	Siemens Energy	Member
22	Giraldo	Orlando	The H-J Family of Companies	Req. Membership
23	Goglia	Slaven	Koncar Power Transformers Ltd.	Guest
24	Gorzin	Alireza	Black & Veatch	Req. Membership
25	Heinzig	Peter	Weidmann	Guest
26	Holifield	Thomas	Howard	Guest
27	Hollrah	Derek	Burns & McDonnell	Guest
28	Hrkac	Miljenko	Hitachi Energy	Guest
29	Janakiraman	Balaji	Virginia Transformer	Guest
30	Jang	Sukin	ILJIN Electric	Guest
31	Jensen	Nick	Delta Star	Guest
32	John	John	Virginia Transformer Corp	Member
33	Kadar	Laszlo	Laszlo & Associates	Guest
34	Kim	Dal-Ho	ILJIN Electric	Guest
35	Kirchenmayer	Egon	Siemens Energy	Member
36	Koprivnjak	Matija	Končar D&ST	Guest
37	Koshel	Anton	Delta Star Inc	Req. Membership
38	Kulasek	Krzysztof	Delta Star Inc.	Member
39	Lope-Fernandez	Xose	Universidade De Vigo	Member
40	Lopez	Libardo	Hitachi Energy	Req. Membership
41	Magela junior	Geraldo	Siemens-Energy	Req. Membership
42	Manzano	Moses	Hyosung HICO	Member
43	Martínez Mares	Alberto	WEG	Req. Membership
44	Matt	Chu	Shihlin Electric	Guest
45	Mendez	Omar	Prolec	Guest
46	Morales-Cruz	Emilio	Qualitrol	Member
47	Munoz	Marta	Hitachi Energy	Member
48	Murcia	Fredy	Siemens Energy	Guest
49	Nambi	Shankar	Bechtel Energy, Inc.	Member
50	Nims	Joe	Allen & Hoshall	Guest
51	Obregon	Daniel	TTE Transformers	Guest
52	Palhatiya	Ajay	Virginia Transformer Corp	Guest

53	Patel	Monil	Pacific Gas and Electric	Guest
54	Patel	Nitesh	Hyundai Power Transformers	Member
55	Patel	Sanjay	Royal Smit Transformers	Member
56	PEREZ	MARCELINO	PROLEC	Req. Membership
57	Reyes perez	Juan	Hitachi energy	Guest
58	Ronchi	Rodrigo	WEG Transformers México	Member
59	SALSWACH	BORIS	SIEMENS ENERGY	Guest
60	Sankarakurup	Dinesh	Duke Energy	Member
61	Sarkar	Amitabh	Virginia Transformer Corporation	Member
62	Schiessl	Markus	SGB	Member
63	Segovic	Dario	Koncar Power Transformers Ltd.	Guest
64	Sethi	Kabir	Hitachi Energy Germany Ag	Member
65	Som	Sanjib	Pennsylvania Trs.	Member
66	Steineman	Andy	Delta Star, Inc.	Guest
67	Swarna	Sunny	Virginia Transformer Corp	Guest
68	Torchia	Leonard	PSE&G	Guest
69	Trujillo	Pedro	Hyundai	Guest
70	Valori	Valentina	Hitachi Energy	Guest
71	Varnell	Jason	Doble Engineering	Member
72	Vullo	Stephen	GE Vernova	Guest
73	Wagner	John	AEP	Guest
74	Wallach	David	Duke Energy	Guest
75	Webb	Bruce	Knoxville Utilities Board	Guest
76	Weisensee	Matt	PacifiCorp	Guest
77	White	Joe	POWER Engineers	Member
78	Yang	Fei	Hitachi Energy	Req. Membership
79	Zhang	Hongzhi	Hitachi Energy	Req. Membership
80	Zhou	Anna	JST Power	Guest

J.9.8 WG PC57.32 Neutral Grounding Devices

S. Kennedy

ANSI/IEEE PC57.32 IEEE Neutral Grounding Devices Working Group Meeting

Hyatt Regency Denver

Denver, CO, USA

Tuesday, Mar 25, 2025

4:45 PM – 6:00 PM

**Chair – Sheldon Kennedy
Vice Chair – Thomas Melle
Secretary – Ed teNyenhuis**

1. Welcome and Chair's Remarks

2. Circulation of Attendance Sheets

(Quorum achieved – 14 of 26 Members; 18 Guests present)

3. Approval of Agenda

(Motion to approve by Sergio Panetta, second by Mike Sharp – motion passed without objection)

4. Patent Call - none

5. Copyright and IEEE Ethics Policies

6. Approval of Minutes from previous Meeting

(Motion to approve by Sergio Panetta, second by Camilo Casallas – motion passed without objection)

7. Reports from TF Leader Assignments

a. Clause 4 - Neutral Grounding Reactors – Camilo Casallas

All main body section draft work and SPAR Annex is complete.

David Caverly presented the SPAR annex.

Camilo will send a slightly revised document after the meeting.

b. Clause 5 - Neutral Ground Fault Neutralizers – Klaus Pointner

All main body work, “Failed Phase Grounding” Annex and “Residual Current Compensator” Annex is complete.

c. Clause 6 - Neutral Grounding Transformers – Don Ayers

All work is complete.

d. Clause 7 - Neutral Grounding Resistors – Ryan Hogg, Sergio Panetta

All work is complete.

e. Clause 8 - Combination Devices - Sergio Panetta

Still need a method for calculating impedance of single phase transformers and/or zigzags. Sergio will add this to the main body draft and send shortly to the Chair.

8. Working Group Survey

An overall draft will be prepared and sent out to the working group before the next meeting for survey.

9. Old Business

None

10. New Business

None

11. Next in-person meeting – Fall 2025 Meeting (IEEE TC – Bonita Springs, Florida USA, October 19-23, 2025)

12. Adjournment at 5.22PM local time

List of Attending Members and Guests

Last Name	First Name	Affiliation	Status
Kennedy	Sheldon	Sheldon P. Kennedy Engineering	Chair
Melle	Thomas	HIGHVOLT	Vice-Chair
teNyenhuis	Ed	Hitachi Energy	Secretary
Casallas	Camilo	Trench Ltd.	Member
Hossain	Saif	Trench Ltd.	Member
McBride	Jim	JMX High Voltage	Member
Sharp	Mike	Trench Ltd.	Member
Cruz Valdes	Juan Carlos	Prolec GE	Member
Hogg	Ryan	Bureau of Reclamation	Member
Panetta	Sergio	I-Gard Corp.	Member
Pointner	Klaus	Trench Austria	Member
Stechschulte	Kyle	AEP	Member
Thomas	Scott	Hitachi Energy	Member
Wong	Terry	Trench	Member
Bhardwaj	Naveen	Trench Group	Guest
Brooks	Jeffrey	Asplundh Engineering	Guest
David	Caverly	Trench	Guest
Dom	Corsi	Doble	Guest
Kaineder	Kurt	Trench Austria	Guest
Keels	Thomas	Keelectric Engineering PLLC	Guest

Klemper	Dmitriy	SCE	Guest
Wirth	Stefan	Coil Innovation	Guest
Xie	Giahao	SRCC Electric	Guest
Qasim	Khan	Neetrac-Georgia Tech	Guest
Luza	Peuc	Koncar	Guest
Stauffer	Jonathan	BOR	Guest
Rato	Nuno	Efacec	Guest
Pedro	Pedro	Efacec	Guest
Burke	David	Xcel Energy	Guest
Propts	Thomas	Dominion Energy	Guest
Gardner	James	Prolec GE	Guest
Guinard	Benjamin	Power Magnetics	Guest

J.9.9 TF Transformer Data Required for System Studies

J. Watson

Performance Characteristics Subcommittee Task Force Meeting Minutes Transformer Data
Required for System Studies

Hyatt Regency Denver at Colorado Convention Center 650
15th Street, Denver CO 80202

Mineral Hall A (3)

Chair: Joe Watson

Vice Chair: Rogerio Verdolin Secretary:
Alwyn Vanderwalt

The Task Force met for the first time at 9:30AM on Monday, 3/24/25 with 50 attendees, including 9 of the 17 members, to establish a quorum. Patent and Copyright requirements were covered. The Minutes from the Fall '24 meeting and the remote meeting that was held on 1/30/25

No motions or other official business were covered. The meeting hosted two presentations on System Studies programs and Transformer Modeling. The first presentation was a remote presentation by Dr. Rohitha Jayasinghe and Dr. Dharshana Muthumuni who work with

the Power Systems Technology Centre at Manitoba Hydro International. The second presentation was in-person by Yuefeng Liang who is a Principal Simulation Engineer with RTDS Technologies in Winnipeg Manitoba.

Both presentations explained that there are many different types of System Studies that need to be performed and that most studies like load flow studies and fault studies can be performed with readily-available transformer data such as the MVA, kV and impedance ratings, but other studies that need to model the transformers' performance under overvoltage or system instability conditions require additional data such as air-core reactance, core saturation curves, winding and core dimensions or dimensional ratios that need to be calculated or estimated from design data that may not be readily available.

The slides from both presentations have been submitted to the webmaster to post on the TF's section of the Performance Characteristics SC's web page.

The TF plans to have a remote meeting in April or May to start work on the report.

The TF intends to meet in the fall 2025 meetings and should need a room for at least 60 attendees.

The meeting adjourned at 10:45.

Meeting Attendees: Note that "New Members" requested membership during the Spring 2025 meeting which was granted when the attendance was recorded.

First Name	Last Name	Affiliation	Status
Mats	Bernesjo	Hitachi Energy	Guest
Enrique	Betancourt	Prolec GE	Guest
Vivian	Chan	Hitachi Energy	Guest
Bhaumik	Choksi	Hitachi Energy	Guest
Olivia	Cordova	Bureau of Reclamation	Guest
Janet	Crockett	Fayetteville PWC	Member
Rich	Cryer	Digitalgrid	Guest
Gabriel	Delgado	Invenergy	Guest
Evgenii	Ermakov	Hitachi Energy	Guest
Ken	Fedor	SGB-Smit	Guest
Patrick	Foster	NextEra	Guest
Lorne	Gara	Shermco Industries	Guest
Ramsis	Girgis	Hitachi Energy	New Member
Donghyun	Jang	LS Electric	Guest

Sukin	Jang	Iljin Energy	Guest
Heun su	Kim	LS Electric	Guest
Ashwini	Labh	Hitachi Energy	New Member
Andrew	Larison	Hitachi Energy	Guest
Weijun	Liang	Braintree Electric Light Dept.	Guest
Ricardo	Lopes	EFACEC	New Member
Libardo	Lopez	Hitachi Energy	Guest
Xose	Lopez-Fernandez	University of Vigo	New Member
Omar	Mendez	Prolec GE	Guest
Juliano	Montanha	Siemens Energy	New Member
Curtis	Moore	Digitalgrid	Guest
Shankar	Nambi	Bechtel Energy, Inc.	Member
Joe yong	Park	LS Electric	Guest
Nitesh	Patel	Hyundai Power Transformers	Guest
Verena	Pellon	NextEra/FPL	Guest
Homer	Portillo	Advanced Power Technology	Guest
Marnie	Roussell	Entergy	Member
Dan	Sauer	Eaton	Guest
Hemchandra	Shertukde	University of Hartford/DDI	New Member
Sanjib	Som	Pennsylvania Transformer Tech	Guest
Hampton	Steele	TVA	Guest
Andy	Steineman	Delta Star	New Member
Maxathe	Swapnil	Megger	New Member
Janusz	Szczechowski	Machenfabrik Reinhausen	Guest
Alwyn	Vanderwalt	ECI	Secretary
Rogério	Verdolin	Verdolin Solutions	Vice-Chair
Dharam	Vix	Prolec GE	New Member
Jolin	Wagner	AEP	Guest
Alan	Washburn	Burns and McConnell	Member
Joshua	Watson	Nebraska Public Power District	Member

Joe	Watson	JD Watson and Associates, Inc.	Chair
Trenton	Williams	Advanced Power Technologies	Guest
Jiahao	Xie	S&C Electric Company	New Member
Fei	Yang	Hitachi Energy	Guest
Joseph	Youn	Iljin Energy	Guest
Zachary	Yu	Sieyuan Toshiba	Guest

J.9.10 WG Entity Winding Deformation Guide PC57.141

L. Zhao

J.9.11 C57.120 – Loss Evaluation Guide

R. Verdolini

TF PAR Study Group Loss Eval for Transformers & Reactors C57.120

Unapproved Meeting Minutes

Spring 2025 Meeting

Tuesday, March 25, 2025

Hyatt Regency Denver – Mineral Hall DEFG

- Meeting called to order at 8:00AM
- Attendance QR code
- K. Zibert, Vice Chair leading meeting
- No prior minutes
- Agenda approved unanimously
- Patent Notice
- IEEE Copyright policy
- Participant Behavior Expectations
- Document Expires 2027
- Title, Scope, and Purpose Discussion - seeking to establish these items, motion, and 2/3 majority to send to SC
- Title: Guide for Loss Evaluation of Distribution and Power Transformers and Reactors
 - M. Nolte - the 2 "and" in the title?
 - Title unanimously agreed to keep as written
- Scope: This guide covers the economic loss evaluation of liquid-filled distribution and power transformers, dry-type distribution and power transformers, and reactors.
 - Alexander Levin - Economic losses only? What about environmental impact? Is there possible overlap with C57.151 in development?
 - K. Zibert - intend to keep exclusively as economic loss, cost of ownership
 - D. Klemptner - Clarify scope for liquid-filled and air-core reactors?
 - Move liquid-filled and dry-type distribution transformers
 - S. Som - please make font larger

- Final: "This guide covers the economic loss evaluation of liquid-filled/immersed and dry-type distribution transformers, power transformers and reactors"
 - S. Som - should this be immersed or filled?
 - V. Valori - reference the current terminology guide?
- Levin - Make sure to clarify in SC for immersed vs. filled
 - Scope accepted - pending for immersed vs filled discussion in SC for PAR
- Purpose (too long to repeat here)
- Levin - some repeats
 - K. Kaineder - Suggest deleting after first few sentences?
 - David Caverly - Is there a risk of getting the PAR tied up with such a long purpose? This is too detailed.
 - K. Adams - Don't like that we're restating our scope.
- Levin - leave as just economic benefit of units of different designs (second sentence)
 - E. Espita - Equipment vs transformers and reactors, need to be cautious we don't unwittingly exclude reactors
 - J. Sneyder - perhaps should keep suggested deletions from a new/young engineer perspective
 - K. Kaineder - it makes more sense to detail this in the main body of the document
 - D. Klemptner/A. Levin - too much and no need to include so much in the purpose
 - Deleting paragraph directly copied from introduction
 - Removal of additional paragraphs that aren't statement of purpose
 - Last paragraph - keep it
 - Add total losses as a better means for being inclusive of reactor losses
 - Rip off first sentence for first sentence of the purpose and wipe the last paragraph
 - Some items move for clarification
 - Purpose as marked up unanimously
- D. Klemptner - moved to approve title/scope/purpose for unanimous consent to move to SC (Wed at 3pm)
- Meeting adjourned at 9:10AM.

First Name	Last Name	Your Affiliation	Role:
Kayland	Adams	Prolec-GE Waukesha	Member
Gilles	Bargone	FISO	Member
Naveen	Bhardwaj	Trench Group	Member
Josipa	Brekalo	Koncar D&ST	Member
Alfredo	Carrizales	Prolec GE	Member
David	Caverly	Trench Limited	Member
Nikolaus	Dillon	Dominion Energy	Member
Egui	Espitia	Reinhausen Manufacturing Inc	Member
Jean Carlos	Hernandez-Mejia	NEETRAC Georgia Tech	Member
Saif	Hossain	Trench Canada	Member

Kurt	Kaineder	TRENCH	Member
Dmitriy	Klempner	Southern California Edison	Member
Matija	Koprivnjak	Končar D&ST	Member
Krzysztof	Kulasek	Delta Star Inc.	Member
Aleksandr	Levin	Weidmann	Member
Parry	lively	Tempel	Member
Xose	LOPEZ-FERNADEZ	Universidade de Vigo	Member
Geraldo	Magela junior	Siemens-Energy	Member
Geraldo	Magela Júnior	Siemens-Energy	Member
Mike	Nolte	Kiewit	Member
Anastasia	OMalley	Consolidated Edison Co NY	Member
Klaus	Pointner	Trench Austria GmbH	Member
Kabir	Sethi	Hitachi Energy Germany Ag	Member
Jason	Snyder	FirstEnergy	Member
SANJIB	SOM	PTT, LLC	Member
Marc	Taylor	JFE Shoji Power Canada	Member
Valentina	Valori	Hitachi Energy	Member
Richard	VonGemmingen	Dominion Energy	Member
Alan	Washburn	Burns & McDonnell	Member
Joshua	Watson	NPPD	Member
Stefan	Wirth	Coil Innovation GmbH	Member
Terry	Wong	Trench Limited	Member
Kris	Zibert	Allgeier Martin	Vice Chair

J.10 Performance Characteristics Subcommittee Attendance List

First Name	Last Name	Affiliation	Role
Sanjib	Som	PTT	Chair
Kris	Zibert	Allgeier Martin	Vice Chair
John	Wagner	AEP	Secretary
Kayland	Adams	Prolec-GE Waukesha	Member
Tauhid	Ansari	Hitachi Energy	Member
Stephen	Antosz	Consultant	Member
Javier	Arteaga	Hitachi Energy	Member
Onome	Avanoma	MJ Consulting	Member

Robert Casey	Ballard	DuPont	Member
Gilles	Bargone	FISO	Member
Enrique	Betancourt	Prolec ge	Member
Daniel	Blaydon	Baltimore Gas & Electric	Member
Jeffrey	Britton	Doble Engineering	Member
Alfredo	Carrizales	Prolec GE	Member
Craig	Colopy	Retired from EATON	Member
Juan Carlos	Cruz Valdes	PROLEC GE	Member
Sami	Debass	EPRI	Member
J Arturo	Del Rio	HSP-US	Member
Nikolaus	Dillon	Dominion Energy	Member
Samraghi	Dutta Roy	Siemens Energy Inc	Member
Evgenii	Ermakov	Hitachi Energy	Member
Reto	Fausch	RF Solutions	Member
Hugo	Flores	Ermco	Member
Jose	Gamboa	The H-J Family of Companies	Member
Eduardo	Garcia Wild	Siemens Energy	Member
Rob	Ghosh	GE Vernova	Member
Ramsis	Girgis	Hitachi Energy	Member
Bill	Griesacker	WGA	Member
Saramma	Hoffman	PPL	Member
Phil	Hopkinson	HVOLT Inc.	Member
Saif	Hossain	Trench Canada	Member
Nick	Jensen	Delta Star	Member
John	John	Virginia Transformer Corp.	Member
Sheldon	Kennedy	Sheldon P Kennedy Engineering	Member
Moonhee	Lee	Hammond Power Solutions	Member
Aleksandr	Levin	Weidmann	Member
Weijun	Li	Braintree Electric Light Department	Member
José Luis	Machain	Prolec GE	Member
Jim	McBride	JMX High Voltage	Member
Thomas	Melle	HIGHVOLT	Member
Francis	Mills	POWER Engineers	Member
Emilio	Morales-Cruz	QUALITROL	Member
David	Murray	TVA	Member

Ryan	Musgrove	Oklahoma Gas & Electric	Member
Aniruddha	Narawane	Eaton	Member
Kris	Neild	Megger	Member
Poorvi	Patel	EPRI	Member
Harry	Pepe	Phenix Technologies	Member
Klaus	Pointner	Trench Austria GmbH	Member
Ion	Radu	Hitachi Energy	Member
Rodrigo	Ronchi	WEG Transformers México	Member
Marnie	Roussell	Entergy	Member
Hakan	Sahin	Virginia transformer	Member
Amitabh	Sarkar	Virginia Transformer Corporation	Member
Daniel	Sauer	Eaton	Member
Markus	Schiessl	SGB	Member
ewald	schweiger	siemens energy	Member
Michael	Sharp	Trench Limited	Member
Christopher	Slattery	FirstEnergy	Member
Steven	Snyder	Hitachi Energy	Member
Kyle	Stechschulte	AEP	Member
Charles	Sweetser	Omicron	Member
Janusz	Szczechowski	Maschinenfabrik Reinhausen GmbH	Member
Ed	teNyenhuis	Hitachi Energy	Member
Ajith	Varghese	Prolec GE Waukesha	Member
Jason	Varnell	Doble Engineering	Member
Dharam	Vir	PROLEC GE	Member
Richard	VonGemmingen	Dominion Energy	Member
Pragnesh	Vyas	Cleveland Cliffs	Member
David	Wallach	Duke Energy	Member
Joe	Watson	JD Watson and Associates	Member
Bruce	Webb	Knoxville Utilities Board	Member
Jeffrey	Wright	Duquesne Light	Member
Joshua	Yun	Virginia Transformer Corp	Member
Peter	Zhao	Hydro one	Member
Waldemar	Ziomek	PTI Transformers LP	Member
Nabi	Almeida	Prolec GE	Guest
Mihirkumar	Amin	Eaton	Guest

Elise	Arnold	SGB	Guest
Prudhvi Anand	Bhattiprolu	AES	Guest
Michael	Botti	Hyosung HICO	Guest
Josipa	Brekalo	Koncar D&ST	Guest
Steven	Brzoznowski	BPA	Guest
Wilerson	Calil	Hitachi Energy	Guest
David	Caverly	Trench Limited	Guest
Michael	Craven	Qualus	Guest
Janet	Crockett	Fayetteville PWC	Guest
Eric	Davis	Consultant	Guest
Luiz	de Oliveira	Hitachi Energy	Guest
Scott	Dennis	Hitachi Energy	Guest
Durnitru	Diaconu	Delta Star Inc.	Guest
Dumitru	Diaconu	Delta Star Inc	Guest
Scott	Digby	Duke Energy	Guest
Luc	Dorpmanns	Royal SMIT Transformers	Guest
Zachary	Draper	Delta-X Research	Guest
Will	Elliott	AEP SWEPCO	Guest
Eric	Elson	San Diego Gas and Electric	Guest
Egui	Espitia.	Reinhausen Manufacturing Inc	Guest
Miguel	Fernandez	Braintree Electric	Guest
Raymond	Frazier	Ameren	Guest
Alan	Fujimori	Romagnole	Guest
Shawn	Gossett	Ameren	Guest
Benjamin	Guinand	Power Magnetics Inc	Guest
Vijay	Gunja	Powertechlabs	Guest
Peter	Heinzig	Weidmann	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
Miljenko	Hrkac	Hitachi Energy	Guest
Jose	Izquierdo	Siemens energy	Guest
Donghyun	Jang	LS ELECTRIC	Guest
Patrycja	Jarosz	IEEE SA	Guest
chanmin	Jeong	HD hyundai	Guest
Laszlo	Kadar	Laszlo & Associates	Guest
Kurt	Kaineder	Trench	Guest

Heonsu	Kim	LS Electric	Guest
Gary	King	Consultant	Guest
Egon	Kirchenmayer	Siemens Energy	Guest
Dmitriy	Klempner	SCE	Guest
Matija	Koprivnjak	Končar D&ST	Guest
Nihat	Kosedagi	ERMCO	Guest
Arvind	Kumar	Delta Star Inc.	Guest
Arvind	Kumar	Delta Star inc	Guest
Bernard	LaBean Jr	Consumers Energy	Guest
Andrew	Larison	Hitachi Energy	Guest
ANDREW	LAWLESS	Potencia Partners	Guest
Fernando	Leal	PROLEC GE	Guest
Ricardo	Lopes	Efacec	Guest
Libardo	Lopez	Hitachi Energy	Guest
XOSE	Lopez-Fernandez	UNIVERSIDADE DE VIGO	Guest
Geraldo	Magela junior	Siemens-energy	Guest
Moses	Manzano	Hyosung HICO	Guest
Alberto	Martinez	WEG Transformers USA	Guest
Omar	Mendez	Prolec	Guest
Juliano	Montanha	Siemens Energy	Guest
Marta	Munoz	Hitachi Energy	Guest
Fredy	Murcia	Siemens Energy	Guest
Ali	Naderian	Consultant	Guest
Shankar	Nambi	Bechtel Energy, Inc.	Guest
Nam Tran	Nguyen	TT Electronics	Guest
Rudolf	Ogajanov	Hitachi Energy	Guest
Juan	Ortiz	Reinhausen Manufacturing	Guest
Ashwin	Padmanaban Iyer	STP	Guest
Jaeyong	Park	LS Electric	Guest
Dean	Park	Hyosung Hico	Guest
Monil	Patel	Pacific Gas and Electric	Guest
Sanjay	Patel	Royal Smit Transformers	Guest
Pedro	Pedro	Efacec Energia	Guest
MARCELINO	PEREZ	PROLEC	Guest
Luka	Peuc	Končar D&ST	Guest

Christoph	Ploetner	Siemens Energy	Guest
Nocholas	Post	WEC Energy Group	Guest
Bertrand	Poulin	Hitachi Energy	Guest
Thomas	Propts	Dominion Energy	Guest
Jonathan	Reimer	FortisBC	Guest
David	Reyes	Oncor	Guest
Juan	Rodriguez	Magnetron	Guest
hyounggon	Ryu	HD Hyundai electric	Guest
Dinesh	Sankarakurup	Duke Energy	Guest
Alfons	Schrammel	Siemens Energy	Guest
Cihangir	Sen	Duke energy	Guest
Kabir	Sethi	Hitachi Energy Germany Ag	Guest
Stephen	Shull	BBC Electrical Services,LLC	Guest
Stefan	Siebert	BROCKHAUS	Guest
Amitkumar	Singh	Conedison	Guest
Jimmy	Smith	Howard Industries	Guest
Jason	Snyder	FirstEnergy	Guest
Markus	Stank	MR	Guest
Hampton	Steele	TVA	Guest
Andy	Steineman	Delta Star, Inc.	Guest
Janusz	Szczechowski	Maschinenfabrik Reinhausen GmbH	Guest
Jonathan	Tan	Northern Transformer	Guest
Troy	Tanaka	Burns & McDonnell	Guest
Erik	Tarango	Olsun electric	Guest
Val	Tatu	Powersmiths	Guest
Marc	Taylor	JFE Shoji Power Canada	Guest
Andreas	Thiede	HIGHVOLT Dresden	Guest
Scott	Thomas	Hitachi Energy	Guest
Fernando	Tirado	Prolec GE	Guest
Eduardo	Tolcachir	TTE transformers	Guest
Leonard	Torchia	PSE&G	Guest
Valentina	Valori	Hitachi Energy	Guest
Joshua	Verdell	ERMCO	Guest
Hector	Villa	Ecuatran SA	Guest
Matt	Weisensee	PacifiCorp	Guest

Paul	Weyandt	Schneider Electric	Guest
Joe	White	POWER Engineers	Guest
Kayla	Whitesel	Delta-X Research	Guest
Calil	Wilerson	Hitachi Energy	Guest
Terry	Wong	Trench Limited	Guest
Terry	Wong	Trench Limited	Guest
Jiahao	Xie	S&C Electric Company	Guest
Fei	Yang	Hitachi Energy	Guest
Hongzhi	Zhang	Hitachi Energy	Guest

Annex K Power Transformers Subcommittee

March 26, 2025

Denver, Colorado, USA

Meeting Time: 1:30-2:45 p.m.

Chair: Ryan Musgrove

Vice Chair: Alwyn VanderWalt

Secretary: Weijun Li

K.1 Meeting Attendance

The Power Transformers Subcommittee (PTSC) met on Wednesday, March 26 at 1:30 p.m. The attendance record indicates that 98 out of 116 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 241 individuals attended the meeting. PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) and Secretary Weijun Li (Braintree Electric Light Department) were present. Vice Chair Alwyn VanderWalt (Electrical Consultants, Inc.) was not in attendance.

Seven individuals requested membership by speaking with or emailing PTSC officers after the meeting. Six attended at least 3 out of the last 5 meetings and therefore qualified for “Member” status. The 7th has not been recorded in attendance in 3 out of the last 5 meetings, and therefore not yet qualified for membership.

A total of 34 individuals were added as “Guests” to the subcommittee. Fourteen individuals updated their contact information. Two individuals have been moved from “Member” to “Guest” for not having recorded attendance at the last 3 out of 5 meetings.

With the membership changes stated above, PTSC has a total of 120 members after the Spring 2025 meeting.

The complete attendance record is provided in Attachment K.1.

K.2 Approval of Agenda and Meeting Minutes

The Chair presented the meeting agenda. Daniel Sauer (Eaton Corporation) made a motion to approve the agenda as presented, which was seconded by Ed teNyenhuis (Hitachi Energy). The agenda was approved without objection. The approved agenda can be found in Attachment K.2. Marcos Ferreira (FEMA) made a motion to approve the Fall 2024 meeting minutes, which was seconded by Daniel Sauer (Eaton Corporation). The Fall 2024 meeting minutes were approved without objection.

K.3 Chair’s Remarks

The Chair provided an update on the PTSC roster. Due to the success and ease of Microsoft Forms sign-in QR code, this has replaced paper rosters for this meeting and will be used for meeting attendance going forward. All members should scan the QR code to sign in. Two members had been moved to Guest status due to not having attended at least 3 out of the last 5 meetings. If someone believes their membership status has been incorrectly changed, or is not shown properly, they should speak with the Chair after the meeting or email him. Attendees were reminded to keep

their email address up to date. Using IEEE alias as contact email is highly recommended. The Chair also announced that guests who wish to become a member of the Power Transformers Subcommittee should see subcommittee officers after the meeting or contact one of the officers by email requesting membership.

The Chair provided an overview of the future scheduled meetings and proposed locations.

The Chair provided an overview of the working group and task force requirements for scheduling meetings, submission of minutes, and other administrative tasks. The Chair stated that meeting invitations should be initiated at least 2 weeks in advance. The Chair suggested that short meetings be held virtually so they won't take up in-person meeting slots.

The Chair provided an update on the new system tracking attendance and reminded the membership to create their account in the new committee management system Memberplanet if they haven't already done so.

The Chair reminded the working groups of patent calls and copyright & participant behavior review at each meeting and note in the minutes.

The Chair emphasized that the name and affiliation of any individual who makes or seconds a motion and the voting results must be recorded in the meeting minutes.

The Chair asked the audience to use a microphone and state their name and affiliation when speaking. The Chair also reminded the group not to interrupt an ongoing motion with the technicality that a motion or second may not be required.

The Chair shared a note from AdCom suggesting that a WG form a comment resolution group to handle comments from the ballot when moving a draft to ballot.

The Chair announced that Patrycja Jarosz is the IEEE staff point of contact for PTSC.

The Chair showed a summary slide and provided an overview of the documents that PTSC is responsible for developing and maintaining.

The Chair introduced 9 new members that were added to the PTSC membership list since the Fall 2024 meeting. The new members are listed below:

Roberto Da Silva (Maschinenfabrik Reinhausen)
Gabriel Delgado (Invenergy)
James Gardner (Prolec GE Waukesha)
Alireza Gorzin (Black & Veatch)
Ronald Hernandez (Doble Engineering Co.)
Nicholas Jensen (Delta Star Inc.)
Timothy Raymond (Consultant)
Yuri Rossini (Siemens Energy)
Drew Welton (Intellirent)

The Chair provided the requirements for establishing & maintaining membership and urged members to participate in all email ballot requests. When a voting member is absent for more than

two consecutive scheduled regular meetings and fails to participate by correspondence, the member may be removed.

All attendees were reminded that pictures are not to be taken during any working group or task force meeting of the work being done unless specifically announced that it is allowed by the chair.

K.4 Working Group and Task Force Reports

K.4.1 Revision of C57.131, Standard Requirements for Tap Changers – Craig Colopy

This group didn't meet in Denver. The final draft (D1.3) was approved as a revised standard by IEEE SA Standards Board Standards Review Committee (RevCom) on February 15, 2024. The revised document has been published with a new expiration date of December 31, 2034.

K.4.2 WG C57.156, Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors – Peter Zhao

This working group met on Monday. A quorum was achieved. WG Chair Peter Zhao (BC Hydro) provided a summary of technical discussions:

A proposal was made to add a new section for the related components. Samuel Brodeur (Hitachi Energy) and Marc Foata (Maschinenfabrik Reinhausen) volunteered for this task and will present a draft section at the next meeting.

Discussed and accepted the proposed changes to Section 5.3.1.

Emilio Morales (Qualitrol Company LLC) confirmed that there is no flow rate curve for mineral insulating oil.

Marc Foata (Maschinenfabrik Reinhausen) made a motion to revise the subclause numbers in Section 5 and the motion was approved unanimously.

The proposed change to Section 5.1 (by Didier Hamoir of Transformer Protector Corp) was partially discussed with no decisions due to time constraints.

The complete meeting minutes can be found in Attachment K.4.2. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.3 Revision of C57.116, Guide for Transformers Directly Connected to Generators – Weijun Li

This working group completed its work in 2022; therefore, they won't meet again until the next revision cycle, possibly 2027.

K.4.4 WG IEEE 638, Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations – Craig Swinderman

This working group met on Monday with 7 members and 21 guests present. 3 guests requested membership. WG Chair Craig Swinderman (Mitsubishi Electric Power Products) said that the PAR was approved on December 6, 2023 with an expiration date of December 31, 2027. The group reviewed Draft 3 of the document. Annex A has been updated. The WG Chair indicated

that further updating of IEEE 638 will be based on changes to another standard IEEE/IEC 60980-344-2020.

The complete meeting minutes can be found in Attachment K.4.4. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.5 WG C57.135, Guide for the Application, Specification, and Testing of Phase-Shifting Transformers – Ewald Schweiger

This working group met on Monday with 60 attendees and achieved a quorum. WG Chair Ewald Schweiger (Siemens Energy) provided an update on document review since the St. Louis meeting.

Kevin Juchem (Hitachi Energy) presented a concept which sections need to be updated or have information moved between Guide C57.135 and Standard 60076-12-1202.

Luc Dorpmanns (Royal SMIT Transformers) presented a comparison of the definitions between Guide C57.135 and Standard 60076-12-1202 with the objective for harmonization. It was decided to prioritize the definitions in the standard and adjust the guide as necessary.

Power System Relaying and Control Committee (PSRC) Chair Michael Thompson (SEL Engineering Services, Inc.) reported that PSRC intends to form a task force to support the phase-shifting transformer work in their meeting in May and started a PAR Study group for the revision of C37.245-2018 IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers.

The group recognized that this is a unique opportunity to harmonize, clean up, and enhance the contents of three relevant documents simultaneously: C57.135 (60076-57-135) Guide for the Application, Specification, and Testing of Phase-Shifting Transformers, IEEE/IEC 60076-57-1202 International Standard Power Transformers, Part 57-1202: Liquid-immersed Phase-Shifting Transformers, and C37.245 IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers.

This working group continues to look for volunteers to review the existing document for improvements and help with editorial changes.

The complete meeting minutes can be found in Attachment K.4.5. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.6 Revision of C57.143, Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Components – Mike Spurlock

This group didn't meet in Denver. WG Chair Mike Spurlock (Spurlock Engineering Services, LLC) was not in attendance. WG Vice Chair Poorvi Patel (EPRI) reported that the draft guide was approved by the IEEE SA Standards Board in December 2024. A copy of the document was forwarded to the Standards Publications Department, and an editor has been assigned to work on the project. WG Vice Chair Poorvi Patel (EPRI) thanked everyone involved for their contributions.

K.4.7 WG C57.12.10, Standard Requirements for Liquid-Immersed Power Transformers – Scott Digby

This working group met on Monday and achieved a quorum. This was the 2nd WG meeting. The current document expires December 31, 2027 and the PAR has an expiration date of December 31, 2028.

WG Chair Scott Digby (Duke Energy) reported that Draft D1 had been circulated for comment since the Fall 2024 meeting. 16 of the 32 comments received were non-editorial, which were the focus of this meeting. The group discussed 11 of those 16 comments. There was one notable item – OLTC being located in the LV winding as baseline for standard versus DG site common practice to locate in HV winding. Volunteers will draft text to add context to applicable section.

The group will continue the review of remaining comments as well as any subsequent comments/questions at the next meeting.

The complete meeting minutes can be found in Attachment K.4.7. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.8 WG C57.140, Guide for Evaluation and Reconditioning of Liquid-Immersed Power Transformers – Marcos Ferreira

This was the 1st WG meeting; therefore, a quorum was not needed. There were 69 participants with 40 requesting membership. Marcos Ferreira (FEMA) is the WG Chair.

The WG discovered a conflict between the Title and Scope in the PAR request and the Title and Scope that was approved to go for a PAR from the Fall 2024 Meeting. The WG officers will address this issue. An e-motion will follow.

A total of 6 task forces were assigned to review other IEEE documents to identify information that overlaps with C57.140.

The complete meeting minutes can be found in Attachment K.4.8. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.9 Revision of C57.125, Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors – Hakan Sahin

This working group met on Monday and achieved a quorum. WG Chair Hakan Sahin (Virginia/Georgia Transformer) reported that the draft document received the WG's approval upon completion of an e-vote. The group reviewed the 3 comments received from the e-vote, decided to seek a PAR extension, and formed a ballot resolution group.

The current document expires on December 31, 2025. In order to have enough time to resolve ballot comments and finalize the document, Hakan Sahin (Virginia/Georgia Transformer) made a motion to approve a 2-year PAR extension to start the ballot process no later than the Fall 2025 meeting, which was seconded by Daniel Sauer (Eaton Corporation). The motion passed with unanimous approval.

Hakan Sahin (Virginia/Georgia Transformer) made another motion to approve the ballot process to start as soon as possible, where the goal is by June of 2025 at the latest. The motion was seconded by Hakim Dulac (Advanced Power Technologies). The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.9. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.10 WG C57.157, Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid-Immersed Transformers – Adam Sewell

This working group met on Tuesday with a total of 35 attendees. A quorum was achieved. The PAR was approved June 2023 and expires December 2027. WG Chair Adam Sewell (Quality Switch, Inc.) reviewed the project timeline with the group.

The group will create draft 1.0 and will need any input from members on recommended changes/additions/deletions to the current document.

The group also identified the need for obtaining test data for synthetic esters. Quality Switch and Specialty Transformer Components volunteered to work on setting up/performing testing using synthetic esters.

The complete meeting minutes can be found in Attachment K.4.10. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.11 WG C57.170, Guide for the Condition Assessment of Liquid Immersed Transformers, Reactors and Their Components – Kumar Mani

This working group met on Tuesday and achieved a quorum. WG Chair Kumar Mani (Duke Energy) reported that a total of 172 comments were received including 37 technical and 135 editorial/general comments from the initial ballot. The comments resolution group had a total of 11 online meetings to resolve the comments.

Draft 2 of the document will be out for a recirculation ballot within a week after the Denver meeting with the goal of sending the guide to RevCom before the Fall 2025 meeting.

The complete meeting minutes can be found in Attachment K.4.11.

K.4.12 Revision of C57.150, Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or Higher – Greg Anderson

This group didn't meet in Denver. The revised guide was approved and published in 2023, with next revision due December 2033.

K.4.13 WG PC57.17, Standard Requirements for Arc Furnace Transformers – Jason Varnell

This working group met on Tuesday with a total of 29 attendees. 13 of 22 members were present; therefore, a quorum was achieved. This was the 3rd meeting as a working group. WG Chair Jason Varnell (Doble Engineering) reported that 3 old business items, which were comments from the 1st straw ballot, were reviewed. Individual motions were unanimously approved to accept the proposed revisions that were drafted during the WG meeting.

The new business was to review the 36 comments from the 2nd straw ballot. Time only permitted 15 of the 36 comments to be resolved with unanimous consent of the WG members present. Prior to the Fall 2025 meeting, the remaining 21 comments will be resolved by the previously assigned TF leaders.

Draft 2.0 will be finalized with all comments resolved and then circulated to the WG before the Fall 2025 meeting.

The complete meeting minutes can be found in Attachment K.4.13. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.14 WG C57.107, Recommended Practice for Developing Short-Term Overexcitation V/Hz Curves for Transformers Directly Connected to Generators – Joe Watson

This working group didn't meet in Denver. This document was approved and published in 2024 with next revision due December 2034.

K.4.15 WG Liquid-Immersed Phase-Shifting Transformers 60076-57-1202 – Ewald Schweiger

This working group met on Tuesday with 45 attendees and achieved a quorum. WG Chair Ewald Schweiger (Siemens Energy) provided an update on document review since the St. Louis meeting.

Kevin Juchem (Hitachi Energy) reported on the progress of the WG at CENELEC concerning IEC/IEEE 60076-57-1202, including Amendment A11.

Luc Dorpmanns (Royal SMIT Transformers) presented a comparison of the definitions between Guide C57.135 and Standard 60076-12-1202 with the objective for harmonization. It was decided to prioritize the definitions in the standard and adjust the guide as necessary.

Power System Relaying and Control Committee (PSRC) Chair Michael Thompson (SEL Engineering Services, Inc.) provided an update on the status of C37.245 (IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers).

The group recognized that this is a unique opportunity to harmonize, clean up, and enhance the contents of three relevant documents simultaneously: C57.135 (60076-57-135) Guide for the Application, Specification, and Testing of Phase-Shifting Transformers, IEEE/IEC 60076-57-1202 International Standard Power Transformers, Part 57-1202: Liquid-immersed Phase-Shifting Transformers, and C37.245 IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers.

This working group continues to seek volunteers to review the existing document for improvements.

The complete meeting minutes can be found in Attachment K.4.15. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.16 WG C57.93, IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – Scott Reed

This working group met on Tuesday and achieved a quorum. This was the 2nd official working group meeting.

WG Chair Scott Reed (MVA) presented the project timeline and stated that the document is being revamped.

The 7 task forces gave their initial updates:

- TF1: Shipping Method and Assembly – Ryan Musgrove (Oklahoma Gas & Electric)
- TF2: Vacuum Processing Methods – Kyle Stechschulte (American Electric Power)
- TF3: Final Testing and Energization – Elizabeth Bray (Southern Company Services)
- TF4: Relocation and Field Repair – Alwyn VanderWalt (Electrical Consultants, Inc.)
- TF5: Maintenance – Weijun Li (Braintree Electric Light Department)
- TF6: Storage – Patrick Rock (American Transmission Co.)
- TF7: Editorial and Definitions – Jesse Duffy (Nashville Electric Service)

The task forces will continue work and report back to the WG at the Fall 2025 meeting.

The complete meeting minutes can be found in Attachment K.4.16. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.17 Liaison to PC57.93a Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – Scott Reed

This is liaison activity related to the topic of low temperature cold starts for transformers with natural ester fluid. The Chinese entity went out to ballot in October 2024 and received 63 comments. All comments were resolved. Because it was an entity PAR, individuals were not permitted to vote on the guide amendment.

The PAR had to be modified to change the word ‘Fluid’ to ‘Liquids.’ The PAR revision was submitted. NesCom and RevCom voted on the PAR revision.

There were no meeting minutes for this liaison activity.

K.4.18 WG C57.153, Guide for Paralleling Regulating Transformers – Mark Tostrud

This working group met on Tuesday and achieved a quorum. WG Chair Mark Tostrud (Dynamic Ratings, Inc.) reviewed the PAR and project timeline with the group.

The group discussed the proposed change to the section discussing how load currents are shared when transformer impedances are not the same. WG Chair Mark Tostrud (Dynamic Ratings, Inc.) provided a status update on the changes to Annex C and requested a volunteer to draft a section on paralleling transformers during reverse power flow due to distributed generation.

A draft guide will be distributed to members and guests once the changes to Annex C are completed.

The complete meeting minutes can be found in Attachment K.4.18. The next in-person meeting is planned for Fall 2025 in Bonita Springs, Florida.

K.4.19 Liaison to Entity PAR C57.145, Recommended Practice on Digital Twin Modeling and Analysis based on Spatial-temporal Data of Switch Cabinet and Transformer with 110kV and Below – Brian Sparling

This entity PAR was approved in June 2023. Brian Sparling (Kinectrics) is the liaison. The last WG meeting was held on November 15, 2024. Guidance was given that the focus should be more on the transformer if this is to be a power transformer standard.

WG Chair Jiayu Want submitted a status report to IEEE SA on March 4, 2025.

1. Draft Progress

The draft version 4.0 is still under development. The WG plans to produce a draft guide in April and have the fifth WG meeting to discuss it. With the issuance of Draft 3.0, about 40% of work had been done. The current draft includes the suitability for transformers and scope of failure/defect type in Section 4 (the architecture part), sensors (type, sampling frequency), algorithms (spatial-temporal data) and IT deployment (recommended configurations) in Section 5 (the deployment part), data modeling for diverse entities/procedure, feature extraction using data analysis, digital twin modeling for transformer and criterion designing for failure/defect diagnosis in Section 6 (the data process part). Two recommended scenarios related to substations in Pudong, Shanghai and Chongqing in China and 1 scenario related to transformer are introduced in Section 7.

2. WG Activities

October 10, 2023: Online kick-off meeting
November 1-29, 2023: Material collection
February 6-30, 2024: Draft compiling of responsible parts
After March 2, 2024: Compiled material and produced Draft 1.0 (for the 2nd WG meeting)
March 22, 2024: The 2nd WG meeting
April 1-29, 2024: Material collection
June 6-30, 2024: Draft compiling of responsible parts
After July 2, 2024: Compiled material and produced Draft 2.0 (for the 3rd WG meeting)
July 8, 2024: The 3rd WG meeting
July 11-29, 2024: Material collection
October 6-25, 2024: Draft compiling of responsible parts
October 26 – November 14, 2024: Compiled material and produced Draft 3.0 (for the 4th WG meeting)
November 15, 2024: The 4th WG meeting
November 20-30, 2024: Material collection
January 6-25, 2025: Draft compiling of responsible parts
After March 2, 2025: Compiled material and produced Draft 4.0 (for the 5th WG meeting)

3. WG Members

State Grid Corporation of China
Shanghai Jiao Tong University
Shandong University
Shanghai University of Electric Power
XJ Group Corporation
China Southern Power Grid Co., Ltd.
EPTC (Beijing) Electric Power Research Institute

Siemens Energy
Megger (non-voting)
Shenyang Transformer Research Institute (non-voting)

4. Future Plans

March 26, 2025: Draft 4.0 completion
April 2025: The fifth WG meeting and approval of Draft 4.0 (Ballot Ready Draft)
May 2, 2025: Submit to Pre-MEC and Mandatory Editorial Coordination (MEC)
June 1, 2025: Update draft based on MEC report
June 2, 2025: Submit draft to PE/TR for approval
July 1, 2025: Initiate ballot invitation
July 2025: Initiate SA ballot

There were no meeting minutes for this liaison activity.

K.4.20 Liaison to Entity PAR “Guide for Power Transformers for Low-frequency (10-30Hz) Power Transmission”

Sheldon Kennedy (Sheldon P. Kennedy Engineering, PLLC), the liaison to this entity PAR, provided the following progress report:

The Entity Working Group met on Webex on Wednesday March 19, 2025 at 8:30 PM EDT.

In attendance were Meng Zhao and Patrycja Jarosz from IEEE and Sheldon Kennedy, Steve Shull and Weijun Li representing the IEEE Transformers Committee.

The Chair, Haojun Liu, called the meeting to order and went through introductions and roster attendance for a quorum. This was the second meeting of the Entity Working Group.

Much of the draft seems to be written specifically for the China offshore windfarm power transmission projects. There are many other low frequency applications at 25 Hz and 16 2/3 Hz in the world that this guide could be useful for.

We pointed out that many of the tables for preferred voltages and kVA ratings are not necessary as this would be an IEEE standard using IEEE C57.12.00. Also, tables specifying required sound levels, no load losses, and load losses are for China only, not for other countries. They should be noted as such or removed. Dimensional requirements seem to be specific to offshore platforms and don't seem to be required of other applications.

It was noted that the PAR should be modified to be for liquid-immersed transformers.

The overall draft reads more like a specification than a guide or standard. This requires quite a few modifications.

The chair promised a detailed plan for the standard with dates and a follow-up Webex meeting with revisions to Draft 1.

The meeting adjourned at 9:50 PM EDT.

The complete liaison report can be found in Attachment K.4.20.

K.5 Old Business

IEEE 693 Recommended Practice for Seismic Design of Substations – Substations Standards Committee

PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) pointed out that any changes in the next revision of IEEE 693 would likely affect power transformer designs. We need volunteers from the Power Transformers and Bushings subcommittees, especially users and transformer manufacturers, to participate in the review and ballot of IEEE 693 once the document is open for revision. Anyone who is interested in getting involved is encouraged to contact IEEE 693 WG Chair Michael Riley at mjriley@bpa.gov.

Steven Brzoznowski (Bonneville Power Administration) pointed out that IEEE 693 Amendment “P693a” requires more studies and dynamic analysis complicating applications of bushings.

PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) displayed the following information for attendees’ consideration:

Website - <https://cmte.ieee.org/pes-substations/scd0/wgd4/>

Next virtual Meeting: Thursday April 3rd 9:00-11:00 AM PDT

IEEE PES Substations Committee Annual Meeting will be held in New Orleans on May 12-16, 2025. Meeting May 14th 8-noon Central, hybrid meeting, virtual available.

K.6 New Business

IEC/IEEE 60214-2 Guide for Tap-Changers – Part 2: Application Guide – Revision due 2029

The revision of this document is due in 2029. The Chair will appoint a volunteer to lead a study group to review the document and suggest next steps. IEC/IEEE 60214-2 is an IEC/IEEE Dual Logo standard and is intended to assist in the selection of tap-changers designed in accordance with IEC 60214-1 or IEEE Std C57.131. Note that IEC 60214-1:2014 Tap-changers – Part 1: Performance Requirements and Test Methods will likely be up for revision soon with a possibility of combining with the recently published C57.131 Standard Requirements for Tap Changers. In consideration of IEEE/IEC Dual Logo document, Craig Colopy (Retired) suggested an approach that would be similar to handling the documents for phase-shifting transformers (C57.135 and 600076-57-1202). Patrycja Jarosz (IEEE SA) said that IEEE needs to coordinate with IEC on how to proceed with this project.

C57.148 – Standard for Control Cabinets for Power Transformers – Revision due 2030

The revision of this document is due in 2030. The Chair appointed Weijun Li (Braintree Electric Light Department) to lead a study group to review the document and suggest next steps. A tentative approach is to email through PTSC to invite interested individuals to attend virtual meeting(s) after the Denver meeting with an objective to decide on a Title, Scope, and Purpose and give a report at the Fall 2025 PTSC meeting. That way, there won’t be a need for

an in-person meeting slot and with approval from the PTSC, will be able to proceed with applying for a PAR and be ready for the first in-person WG meeting in Spring 2026.

K.7 Adjournment

The meeting adjourned at 2:45 p.m.

K.8 Attachments

Attachment K.1 – Attendance

Attachment K.2 – Agenda

Attachment K.4.1 – C57.131 (No Meeting)

Attachment K.4.2 – C57.156 Minutes

Attachment K.4.3 – C57.116 (No Meeting)

Attachment K.4.4 – IEEE 638 Minutes

Attachment K.4.5 – C57.135 Minutes

Attachment K.4.6 – C57.143 (No Meeting)

Attachment K.4.7 – C57.12.10 Minutes

Attachment K.4.8 – C57.140 Minutes

Attachment K.4.9 – C57.125 Minutes

Attachment K.4.10 – C57.157 Minutes

Attachment K.4.11 – C57.170 Minutes

Attachment K.4.12 – C57.150 (No Meeting)

Attachment K.4.13 – C57.17 Minutes

Attachment K.4.14 – C57.107 Minutes (No Meeting)

Attachment K.4.15 – 60076-57-1202 Minutes

Attachment K.4.16 – C57.93 Minutes

Attachment K.4.17 – Liaison to PC57.93a (No Meeting Minutes)

Attachment K.4.18 – C57.153 Minutes

Attachment K.4.19 – Liaison to Entity PAR for C57.145 (No Meeting Minutes)

Attachment K.4.20 – Liaison to Entity PAR for Guide for Power Transformers for Low-Frequency Power Transmission (Liaison Report)

Attendance Record

Role	First Name	Last Name	Company
Guest	Isaac	Abdalla	HICO America
Member	Kayland	Adams	Prolec GE Waukesha
Guest	Anthony	Alexander	Hitachi Energy
Guest	Rehan	Ali	Siemens Energy
Member	Tauhid Haque	Ansari	Hitachi Energy
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Elise	Arnold	SGB
Member	Javier	Arteaga	Hitachi Energy
Member	Onome	Avanoma	MJ Consulting
Member	Gilles	Bargone	FISO Technologies Inc.
Guest	Jason	Beaudoin	Weidmann Electrical Technology
Guest	Jean-Noel	Berube	Rugged Monitoring Inc.
Member	Enrique	Betancourt	Prolec GE
Guest	Naveen	Bhardwaj	Trench Group
Guest	Piotr	Blaszczyk	Specialty Transformer Components LLC
Member	Daniel	Blaydon	Baltimore Gas & Electric
Member	William	Boettger	Boettger Transformer Consulting LLC
Member	Paul	Boman	Hartford Steam Boiler
Member	Michael	Botti	Hyosung HICO
Member	Jeremiah	Bradshaw	Bureau of Reclamation
Guest	Garrett	Bradshaw	Howard Industries
Guest	Josipa	Brekalo	Koncar D&ST
Guest	Jeffrey	Britton	Doble Engineering Co.
Guest	Samuel	Brodeur	Hitachi Energy
Guest	Steven	Brzoznowski	Bonneville Power Administration
Guest	David	Burke	Xcel energy
Member	David	Calitz	Siemens Energy
Guest	Juan Alfredo	Carrizales	Prolec GE
Member	Juan	Castellanos	Prolec GE
Guest	David	Caverly	Trench Limited
Guest	Adriana	Cisco Sullberg	Salt River Project
Member	Craig	Colopy	Retired - General Interest
Guest	Michael	Craven	Qualus Corp.
Guest	Daniel	Crockett	Ameren
Guest	Janet	Crockett	Fayetteville PWC
Member	Juan Carlos	Cruz Valdes	Prolec GE

Guest	Marcos	Czernorucki	Hitachi Energy
Member	Roberto	Da Silva	Maschinenfabrik Reinhausen
Guest	Tim	Dappen	Cargill
Member	Eric	Davis	Consultant
Guest	Samson	Debass	EPRI
Member	Gabriel	Delgado	Invenergy
Guest	Dumitru	Diaconu	Delta Star Inc
Member	Scott	Digby	Duke Energy
Guest	Nikolaus	Dillon	Dominion Energy
Guest	Luc	Dorpmanns	Royal SMIT Transformers
Guest	Zachary	Draper	Delta-X Research Inc.
Guest	Jesse	Duffy	Nashville Electric Service
Member	Hakim	Dulac	Advanced Power Technologies
Member	Samraghi	Dutta Roy	Siemens Energy
Guest	William	Elliott	AEP-SWEPCO
Guest	Eric	Elson	SDGE
Member	Evgenii	Ermakov	Hitachi Energy
Guest	Egui	Espitia	Reinhausen Mfg
Member	Reto	Fausch	RF Solutions
Guest	Miguel	Fernandez	Braintree Electric Light Dept.
Member	Marcos	Ferreira	FEMA
Member	Hugo	Flores	ERMCO
Member	Bruce	Forsyth	Cargill
Guest	Raymond	Frazier	Ameren
Guest	Jean-Philippe	Gagnon	Qualitrol Company LLC
Guest	Jose	Gamboa	H-J Family of Companies
Member	Eduardo	Garcia Wild	Siemens Energy
Member	James	Gardner	Prolec GE Waukesha
Guest	Joshua	Garner	RESA Power
Member	Rob	Ghosh	GE Vernova
Member	Ramsis	Girgis	Hitachi Energy
Member	Alireza	Gorzin	Black & Veatch
Guest	Shawn	Gossett	Ameren
Guest	Matthew	Greenhaw	OG&E
Member	Bill	Griesacker	William Griesacker and Associates
Member	Niklas	Gustavsson	Hitachi Energy
Member	Attila	Gyore	MIDEL
Guest	Didier	Hamoir	Transformer Protector Corp
Guest	Kevin	Hampton	Siemens Energy
Member	Roger	Hayes	GE Vernova

Member	Kyle	Heiden	EATON Corporation
Guest	Peter	Heinzig	Weidmann Electrical Technology
Member	Ronald	Hernandez	Doble Engineering Co.
Member	Saramma	Hoffman	PPL Electric Utilities
Member	Ryan	Hogg	Bureau of Reclamation
Member	Philip	Hopkinson	HVOLT Inc.
Guest	Miljenko	Hrkac	Hitachi Energy
Guest	Karl	Jakob	Cargill
Guest	Balaji	Janakiraman	Virginia Transformer
Guest	Sukin	Jang	ILJIN Electric
Guest	Patrycia	Jarosz	IEEE SA
Member	Nicholas	Jensen	Delta Star Inc.
Guest	Chanmin	Jeong	HD Hyundai
Member	John	John	Virginia Transformer Corp.
Guest	Laszlo	Kadar	Laszlo & Associates
Member	Kurt	Kaineder	Trench Austria
Guest	Mick	Kasonga	ONCOR Electric
Guest	Thomas	Keels	kEElectric Engineering PLLC
Member	Sheldon	Kennedy	Sheldon P. Kennedy Engineering, PLLC
Guest	Qasim	Khan	Neetrac Georgia Tech
Guest	Yeounsoo	Kim	JST Power Equipment
Guest	Heonsu	Kim	LS Electric
Member	Zan	Kiparizoski	Howard Industries
Member	Egon	Kirchenmayer	Siemens Energy
Member	Dmitriy	Klempner	Southern California Edison
Guest	Matija	Koprivnjak	Končar D&ST
Guest	Nihat	Kosedagi	ERMCO
Guest	Rafal	Kowalski	Hitachi Energy
Guest	Alexander	Kraetge	OMICRON electronics Deutschland GmbH
Guest	Arvind	Kumar	Delta star inc
Guest	Andreas	Kurz	MR
Guest	Landen	Kwan	NRC
Guest	Bernard	Labean Jr.	Consumers Energy
Guest	Ashwini	Labh	Hitachi Energy
Guest	Komelabbas	Lakhani	Siemens energy
Guest	Fernando	Leal	Prolec GE
Secretary	Weijun	Li	Braintree Electric Light Dept.
Guest	Cesar	Lizcano	Shell USA, Inc.
Guest	Luc	Loiselle	Tetra Tech
Guest	Ricardo	Lopes	Efacec Energia, SA

Member	Jose	Machain	Prolec GE
Guest	Geraldo	Magela Júnior	Siemens-Energy
Guest	Jinesh	Malde	M&I Materials Inc.
Member	Kumar	Mani	Duke Energy
Guest	Francis	Mantoan	Siemens Energy
Guest	Moses	Manzano	Hyosung HICO
Guest	Alonso	Mario	Georgia Transformer
Guest	Alberto	Martinez	WEG
Guest	Tom	Matson	Xcel Energy
Guest	James	McBride	JMX Services, Inc.
Member	Thomas	Melle	HIGHVOLT
Guest	Toni	Mellin	Vaisala
Guest	Omar	Mendez Zamora	Prolec GE
Guest	Logan	Merrill	OMICRON
Member	Francis	Mills	Power Engineers, Inc.
Guest	Juliano	Montanha	Siemens Energy
Member	Emilio	Morales-Cruz	Qualitrol Company LLC
Guest	Marta	Munoz	Hitachi Energy
Guest	Fredy	Murcia	Siemens Energy
Member	David	Murray	Tennessee Valley Authority
Chair	Ryan	Musgrove	Oklahoma Gas & Electric
Guest	Shankar	Nambi	Bechtel
Guest	Anthony	Natale	HICO America
Member	Kristopher	Neild	Megger
Guest	Mark	Newbill	Hitachi Energy
Guest	Daniel	Obregon	TTE Transformers
Member	Anastasia	O'Malley	Consolidated Edison Co. of NY
Guest	Juan	Ortiz	Reinhausen Manufacturing
Guest	Ashwin	Padmanaban Iyer	STP
Guest	Manan	Pandya	Siemens Energy
Guest	Parminder	Panesar	Virginia Transformer Corp.
Guest	Dean	Park	Hyosung HICO
Guest	Dwight	Parkinson	EATON Corporation
Member	Poorvi	Patel	Electric Power Research Institute (EPRI)
Guest	Sanjay	Patel	Smit Transformer
Guest	Pedro	Pedro	Efacec Energia
Guest	Verena	Pellon	Florida Power & Light
Guest	Harry	Pepe	Phenix Technologies, Inc.
Guest	Christoph	Ploetner	Siemens Energy
Guest	Homero	Portillo	Advanced Power Technologies

Guest	Bertrand	Poulin	Hitachi Energy
Guest	John	Pruente	APC Construction llc
Guest	Crystal	Qiao	Trench Limited
Member	Ion	Radu	Hitachi Energy
Guest	Sheila	Ray	US Nuclear Regulatory Commission
Member	Timothy	Raymond	Inductive Reasoning
Member	Scott	Reed	MVA
Guest	Sebastian	Rehkopf	Maschinenfabrik Reinhausen
Guest	Jonathan	Reimer	FortisBC
Guest	David	Reyes	ONCOR
Guest	Diego	Robalino	Megger
Guest	Patrick	Rock	American Transmission Co.
Guest	Juan	Rodriguez	Magnetron
Guest	Rodrigo	Ronchi	WEG-Voltran
Member	Yuri	Rossini	Siemens Energy
Member	Marnie	Roussell	Entergy
Guest	Christopher	Rutledge	GE Vernova
Guest	Hyounggon	Ryu	HD Hyundai electric
Member	Mickel	Saad	Hitachi Energy
Member	Hakan	Sahin	Virginia/Georgia Transformer
Guest	Jesus	Sanchez rodriguez	Vertiv
Member	Dinesh	Sankarakurup	Duke Energy
Guest	Amitabh	Sarkar	Virginia Transformer Corp.
Guest	Garret	Sarkinen	Xcel Energy
Member	Daniel	Sauer	EATON Corporation
Member	Alan	Sbravati	Hitachi Energy
Member	Markus	Schiessl	SGB
Guest	Alfons	Schrammel	Siemens Energy
Member	Dan	Schwartz	Quality Switch, Inc.
Member	Ewald	Schweiger	Siemens Energy
Member	Cihangir	Sen	Duke Energy
Guest	Kabir	Sethi	Hitachi Energy
Member	Adam	Sewell	Quality Switch, Inc.
Guest	Jeremy	Sewell	Quality Switch, Inc.
Member	Stephen	Shull	BBC Electrical Services, Inc.
Guest	Jonathan	Sinclair	Black & Veatch
Guest	Amitkumar	Singh	Consolidated Edison Company of New York
Guest	Ahmad	Skeik	Crosslink Technology
Guest	Jason	Snyder	FirstEnergy Corp.

Member	William	Solano	Voltyx
Member	Sanjib	Som	Pennsylvania Transformer
Member	Fabian	Stacy	Hitachi Energy
Member	Markus	Stank	Maschinenfabrik Reinhausen
Member	Kyle	Stechschulte	American Electric Power
Guest	Hampton	Steele	Tennessee Valley Authority
Guest	Andrew	Steineman	Delta Star Inc.
Guest	Sunny	Swarna	Virginia Transformer Corp
Guest	Charles	Sweetser	OMICRON electronics Corp USA
Member	Craig	Swinderman	Mitsubishi Electric Power Products
Member	Janusz	Szczechowski	Maschinenfabrik Reinhausen
Guest	Jonathan	Tan	Northern Transformer
Member	Troy	Tanaka	Burns & McDonnell
Guest	Marc	Taylor	JFE Shoji Power Canada Inc.
Member	Ed	teNyenhuis	Hitachi Energy
Guest	Andreas	Thiede	Highvolt
Guest	Scott	Thomas	Hitachi Energy
Member	Ryan	Thompson	Burns & McDonnell
Guest	Timothy	Tillery	Howard Industries
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Guest	Valentina	Valori	Hitachi Energy
Member	Jason	Varnell	Doble Engineering Co.
Guest	Juan	Velasquez	Magnetron
Guest	Hector	Villa	Ecuatran SA
Member	Dharam	Vir	Prolec GE
Member	Richard	vonGemmingen	Dominion Energy
Guest	Stephen	Vullo	GE Vernova
Member	Pragnesh	Vyas	Cleveland Cliffs
Member	David	Wallach	Duke Energy
Guest	Alan	Washburn	Burns & McDonnell
Member	Joe	Watson	JD Watson and Associates Inc.
Member	Bruce	Webb	Knoxville Utilities Board
Guest	Matthew	Weisensee	PacifiCorp
Guest	Joe	White	Power Engineers
Guest	Christopher	Whitten	Hitachi Energy
Member	Trenton	Williams	Advanced Power Technologies
Guest	Deanna	Woods	PTT
Member	Jeffrey	Wright	Duquesne Light Co.
Guest	Jiahao	Xie	S&C Electric Company
Guest	Fei	Yang	Hitachi Energy

Guest	Kwasi	Yeboah	GE Vernova
Guest	Tim	Young	Hitachi Energy
Member	Joshua	Yun	Virginia Transformer Corp.
Guest	Hongzhi	Zhang	Hitachi Energy
Member	Kris	Zibert	Allgeier, Martin and Associates
Member	Waldemar	Ziomek	PTI Transformers

Agenda

1. Call to order
2. Distribution of Roster
3. Chair remarks
4. New Members
5. Determine quorum
6. Approval of agenda, approval of previous meeting minutes (sent by e-mail)
7. Working Group and Task Force reports
 - a. *WG Revision of C57.131, Tap Changers (no meeting)*.....Craig Colopy
 - b. WG C57.156, Guide for Tank Rupture Mitigation.....Peter Zhao
 - c. *WG Revision of C57.116, GSU Transformers (Completed 2022 – no meeting)*.....Weijun Li
 - d. WG Class 1E Transformer for Nuclear Power gen Std. 638 Craig Swinderman
 - e. WG 60076-57-135, Guide for Phase shifting Transformers.....Ewald Schweiger
 - f. WG 60076-57-1202 Liquid Immersed Phase-Shifting Transformers Ewald Schweiger
 - g. *WG Revision of C57.143, Monitoring Guide (no meeting)*.....Mike Spurlock
 - h. WG Std Requirement for Liquid-Immersed Power TR – C57.12.10.....Scott Digby
 - i. WG Guide for Evaluation & Reconditioning of Liquid Immersed TR C57.140.....Marcos Ferreira
 - j. WG Revision of C57.125, Failure Investigating and Reporting.....Hakan Sahin
 - k. WG C57.157, Guide for Life test of Switch Contacts.....Adam Sewell
 - l. WG C57.170, Condition Assessment Guide Kumar Mani
 - m. *WG Revision of C57.150, Transportation Guide (No meeting)*.....Greg Anderson
 - n. WG C57.17, Standard Requirements for Arc Furnace Transformers.....Jason Varnell
 - o. *WG C57.107, Transformer Volts per Hertz (No meeting)*.....Joe Watson
 - p. WG C57.93, Installation and Maintenance Guide.....Scott Reed
 - q. Liaison to PC57.93a – Installation and Maintenance Guide.....Scott Reed
 - r. WG C57.153, Guide for Paralleling Transformers.....Mark Tostrud
 - s. Liaison to Entity PAR C57.145 – Digital Twin for Power Equipment (DTPE)....Brian Sparling
 - t. Liaison to Entity PAR Guide for PT for Low-Frequency Power Transmission.....Sheldon Kennedy
8. Old business
 - a. IEEE 693 Recommended Practice for Seismic Design of Substations – Substations Standards Committee – Need volunteers, especially users and transformer manufacturers. Contact – Michael Riley – mjriley@bpa.gov
 - a. Website - <https://cmte.ieee.org/pes-substations/scd0/wgd4/>
9. New business
10. Adjournment

Title: WG Guide for Tank Rupture Mitigation PC57.156

Time: 9:30 AM- 10:45 AM, Monday, March 24, 2025

Place: Hyatt Regency Denver at the Colorado Convention Center, Denver, CO, US

Chair: Peter Zhao **Vice-Chair:** Samuel Brodeur **Secretary:** Hakim Dulac

1. Call to Order at 9:30am

- a. Chair's Remarks
- b. IEEE-SA Policies
 - i. Call for Essential Patents slide presented, and the group made no patent claims.
 - ii. Copyright policies slide presented
- c. Quorum

WG active member	Member required for Quorum (> 50%)	Member present	Total attendance (Guest and member)	Quorum established	Non-members that requested Membership
25	13	14	48	Yes	13

2. Approval of the Agenda

- a. Motion to accept the spring 2025 agenda
 - i. Moved: Eduardo Garcia
 - ii. Seconded: Dave Murray
 - iii. The spring 2025 agenda was unanimously approved.

3. Approval of Meeting Minutes

- a. Motion to accept minutes of the fall 2024 meeting (St. Louis).
 - i. Moved: Eduardo Garcia
 - ii. Seconded: Sanjib Som
 - iii. There was a discussion and explanation on the level of details to be included in the minutes. The fall 2024 meeting minutes were unanimously approved.

4. Technical Topics

- i. Proposal was made to add a new section dedicated to Related Components. Samuel Brodeur and Marc Foata will work on the contents of new section and present it in the next meeting.

- ii. Reviewed the proposed changes for Subclause# 5.3.1. Discussion and amendment were made on wordage. A motion was made by Samuel Brodeur and seconded by Marc Foata to approve the resulted text shown on the screen. The motion was approved unanimously.
- iii. The recommendation from the subgroup on Subclause 5.3.3 was to keep the air flow vs Pressure curve as it is. Emilio Morales confirmed that there is no oil flow rate vs pressure curve available and therefore, no changes will be made to Subclause 5.3.3.
- iv. Marc Foata moved a motion to revise Subclause numbering of Clause 5, and Samuel Brodeur seconded it. The motion was approved unanimously.

5. Action Items

- a. None

6. Unfinished Business

- a. The proposal for revision of Subclause# 5.1 was discussed. We did not have time to complete it, however, few people suggested keeping the text as it is. The discussion will continue during the next meeting.

7. New Business

- a. None

8. Next Meeting

- a. Next Meeting date and location: Bonita Springs FL, October 19-23, 2025.

Reported by:
Hakim Dulac, P.Eng.
WG secretary

Attendance:

Name	Affiliation	Member (yes, no, requested)
Ashwin Padmanaban Iyer	Transformer protector Corp	Requested
David Calitz	Siemens Energy	yes
David Murray	TVA	yes
David Reyes	Oncor	Requested
Derek Hollrah	Burns&McDonnell	yes
Didier Hamoir	Transformer Protector CORP.	Requested
Eduardo Garcia	Siemens Energy	yes

Emilio Morales Cruz	Qualitrol	Requested
Eric Schleismann	Southern Company	no
Francis Mills	Power Engineers	Requested
Hakim Dulac	APT	yes
Hector Garza	Orto de Mexico	no
Jason Snyder	FirstEnergy	no
Joe Nims	Allen& Hoshall	no
Jose Luis Machain	Prolec GE	yes
Joshua Yun	Virginia Transformer	yes
Kevin Juchem	Hitachi Energy	no
Krzysztof Kulasek	Delta Star	no
Manan Pandya	Siemens energy	Requested
Marc Foata	MR	yes
Martin Munoz	Orto de Mexico	no
Michael Botti	Hyosung HICO	yes
Moses Manzano	Hyosung HICO	yes
Niklas Gustavsson	Hitachi Energy	no
Peter Zhao	Hydro One	yes
Rehan Ali	Siemens Energy, Inc.	no
Ryan Musgrove	Oklahoma Gas & Electric	Requested
Samson Debass	EPRI	yes
Samuel Brodeur	Hitachi Energy	yes
Sanjib Som	PTT, LLC	yes
Sebastian Rehkopf	MR	Requested
Steven Brzoznowski	BPA	no
Waldemar Ziomek	PTI Transformers	Requested
William Solano	Voltyx	Requested
Heinrich Rhys	Roechling	no
Luc Dorpmanns	Royal SMIT Transformers	no
Adams Kayland	Prolec-GE Waukesha	no
Greenhaw Matthew	OG&E	Requested
Luc Loiselle	Tetra tech	no
Pedro Trujillo	Hyundai	no
Sethi Kabir	Hitachi Energy Germany Ag	Requested
Lakhani Komelabbas	Siemens Energy	no
Juan Rodriguez	Magnetron	no
Bernard LaBean Jr	Consumers Energy Company	no
Jean-philippe Gagnon	Qualitrol	no
Geraldo Magela Junior	Siemens Energy	no
Ronny Doerr	SGB Smit Group	no
Eduardo Orozco	GE Vernova Grid Solutions	Requested

Document #: **638**

Document Title: **Qualification of Class 1E Transformers for Nuclear Power Generating Stations**

Chair: Craig Swinderman Vice Chair Robert Allison
Secretary: Dominic Pollaro Percent Complete: 70%

Meeting Date: Monday, March 24, 2025 Time: 11:00 am to 12:15 pm.
Location: Hyatt Regency; Denver, Colorado- Centennial G(3)

Current draft being worked on: 3.0 Dated: March 2025
PAR Expiration date: December 31, 2027

Attendance: Members:	7
Guests:	21
Guests requesting membership:	3
Total*:	<u>28</u>

* A list of attendees is included at the end of these minutes.

Meeting Minutes / Significant Issues / Comments:

1. Meeting was called to order at 11:00am by Working Group Chair Craig Swinderman.
2. Presentation of Agenda:
The agenda for the meeting was submitted for review in advance of the meeting.
3. Presentation of IEEE Standards Slides:
IEEE Essential Patent Slides and Copyright policy were presented, and no issues received from the attendees.
4. Distribution of attendance sheets:
 - a. Attendance was taken with a paper roster.
 - b. Please send an email to craig.swinderman@meppi.com with the subject: P638 EMAIL to be added to the P638 email list.

5. Checking the Quorum:
 - a. 7 out of 13 members were in attendance of the meeting so quorum was achieved.
6. Approval of the Meeting Minutes from St. Louis Fall 2024 and Agenda for Spring 2025:
 - a. Approval of the Fall 2024 meeting unapproved minutes
 - i. Robert Allison motioned to approve.
 - ii. Ryan Musgrove seconded.
 - iii. Motion was carried unanimously with no objections or abstentions. – Approved.
 - b. Approval of the Spring 2025 agenda
 - i. Robert Allison motioned to approve.
 - ii. David Murray seconded.
 - iii. Motion was carried unanimously with no objections or abstentions. – Approved.
7. Chair announcements:

The PAR for revision of 638 was approved on December 6, 2023, and will expire on December 31, 2027. The target date for completing the updated standard is mid-2026 for submittal to start the ballot process.
8. Old work: Voting on wording changes to P638 Draft 3.

Approval of Section 5.3 Thermal Life qualification

- ✓ Motion to Approve - Grace Yuan
- ✓ Second - Robert Allison
- ✓ No Objections
- ✓ Change Approved

Approval of Section 6.1 Line 28

- ✓ Motion to Approve - Ryan Musgrove
- ✓ Second - Grace Yuan
- ✓ No Objections
- ✓ Change Approved

Approval of Section Annex A A.3.4.2 -“Insulation life-temperature relationship”

- ✓ Motion to Approve - Robert Allison
- ✓ Second – David Murray
- ✓ No Objections
- ✓ Change Approved

Section A3.3 Deletion of reference of “(more than 100 h)” & replace with “Details of this relationship can be found in IEEE C57.12.60 and IEEE C57.100.”

- ✓ Motion to Approve - Robert Allison
- ✓ Second - Grace Yuan
- ✓ No Objections – Approved

Section A3.4.1 Deletion of formula & replace with “Details of this relationship can be found in IEEE C57.12.60 and IEEE C57.100.”

- ✓ Motion to Approve – Grace Yuan
- ✓ Second – Robert Allison
- ✓ No Objections – Approved

9. New Work:

- ✓ Joseph Tedesco volunteered to update sections 6.4 and 6.5 of the draft P638 to reflect recent changes in Seismic qualification requirements from IEC/IEEE 60980-344 2020, to be completed before next WG meeting.

10. Next meeting: Bonita Springs, FL on Oct. 20, 2025

11. Close of meeting:

The meeting adjourned at 12:00 pm

Submitted by: Craig Swinderman Date: March 25, 2025

List of Meeting Attendees at Spring '25 Meeting, including affiliation & voting member status.

NAME	COMPANY	ROLE
Anthony Alexander	Hitachi Energy	Guest
Robert Allison	Dominion Energy	Member
Mario Alonso	Georgia Transformer	Guest
Jason Beaudoin	Weidmann	Guest
Juan Carlos Cruz Valdes	Prolec GE	Guest
Ronald Hernandez	Doble Engineering	Guest
Chan Min Jeong	HD Hyundai Electric	Guest
Yeounsoo Kim	JST Power Equipment	Member
Landen Kwan	US NRC	Guest
Weijun Li	Braintree	Guest
Ricardo Lopes	Efacec	Guest
Geraldo Magela, Jr.	Siemens Energy	Guest
Logan Merrill	Omicron	Guest
David Murray	TVA	Member
Ryan Musgrove	OG&E	Member
Kris Neild	Megger	Guest
Niteshkumar Patel	Hyundai Power Transformers USA	Guest
Dominic Pollaro	NASS	Member
Sheila Ray	US NRC	Guest
Marnie Roussell	Entergy	Guest
Hyoung Gon Ryu	HD Hyundai Electric	Guest
Ahmad Skeik	Crosslink Technology	Guest
Craig Swinderman	Mitsubishi Electric Power Products, Inc.	Member
Janusz Szczechowski	Maschinenfabrik Reinhausen	Guest
Joseph Tedesco	Hitachi Energy	Guest
Pedro Trujillo	Hyundai Power Transformers USA	Guest
Christopher Whitten	Hitachi Energy	Guest
Grace Yuan	Hitachi Energy	Member

Working Group C57.135 - IEC/IEEE 60067-57-135

Chair: Ewald Schweiger
Secretary: Richard von Gemmingen

Guide for the Application, Specification and Testing of Phase-Shifting Transformers

- 1) Meeting was called to order at 1:45 PM (MDT) on Monday March 24th, 2025, with “Welcome & Chair’s remarks”.
- 2) Details about attendance:
 - Attendance: 58
 - Members: 19
 - Guests: 39
- 3) QR code for electronic sign-in was used instead of paper roster
- 4) Agenda was displayed
- 5) Call for essential patents
 - IEEE slides on essential patents have been provided in the meeting invitation, posted on the internet and were shown and a call for essential patents was made.
→ No essential patents or issues were reported.
- 6) Code of Ethics and Conduct
 - IEEE slide on code of ethics and conduct was reviewed.
- 7) Copyright Policy
 - Slides of the IEEE copyright policy have been provided in the meeting invitation, posted on the internet and were shown and request made to identify any potential copyright issues.
- 8) Participant behavior
 - The slides on “Participant behavior in IEEE-SA activities is guided by the IEEE Codes of Ethics & Conduct” have been presented.
- 9) Membership Roster displayed.
- 10) Quorum check
 - Total number of members is 27 requiring 14 members for quorum.
 - 19 members were present. → Quorum was achieved.
- 11) Approval of agenda
 - Eric Davis presented motion to approve the agenda
 - Marcus Stank provided second.
 - Motion was unanimously approved by Working Group members
- 12) Approval of meeting minutes from fall 2024 were posted
 - The Meeting Minutes were posted on the [PTRC website](#).
 - Eric Davis presented motion to approve the agenda.
 - Marcus Stank provided second.
 - Motion was unanimously approved by Working Group members.
- 13) Dual Logo and IEC status updated by Kevin Juchem and Ewald Schweiger
 - IEC TC 14 Plenary meeting in Rome Italy April of 2024 decided to form a MT (Maintenance Team) with title ‘phase-shifting transformers’ and scope ‘to maintain standards dealing with phase shifting-

transformers projects'. MT 60076-57-PST has been established to work on the revision of IEC/IEEE 60076-57-1202 and IEC/ IEEE 60076-57-135 and appointed Kevin Juchem as convener.

- Kevin Juchem provided update on international participants of IEC team.
- Ewald Schweiger reiterated how this makes alignment of IEC and IEEE easier for this document.

14) Mike Thompson, PSRC (Power Systems Relaying and Controls Committee) liaison provide update on C37.245 (IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers)

- PSRC met in January and discussed updating C37.245 in parallel with IEC/IEEE 60067-57-135.
- Subcommittee agreed to form a task force to support the revision of our PST Guide / Standard.
- Next PSRC meetings will be in May and September this year.
- May meeting will be earliest that a PAR study group for C37.245 can be formed.
- Update conclude and opportunity was presented to membership for discussion. No discussion or questions were presented.

15) Topic 1 – Definitions:

- Luc Dorpmanns presented a review of definitions from the Standard and the guide.
- In most cases the definitions align well.
- Recommendation is to keep and use definition list from standard and use this in guide.
- Christoph Ploetner commented that IEC just finished the IEC definitions and will provide this to Luc.
- Motion:
 - 1) Luc Dorpmanns made motion to: “use definitions as we have in the standard for the guide “.
 - 2) Kevin Juchem seconded the motion.
 - 3) After much good discussion, the motion was unanimously approved.
 - 4) Details of discussion prior to vote on motion:
 - a. Joe Watson commented on use of figures and need to clarify decision not to have figures in definitions.
 - b. Luc Dorpmanns responded that figures are separate in guide from definitions.
 - c. Mike Thompson commented if we do not have definitions will they go into the IEEE technical guideline?
 - d. Ewald Schweiger responded he did not know and would check.
 - e. Christoph Ploetner commented that IEC does not allow figures in definitions.
 - f. Ewald Schweiger suggested we use IEC as template and have the figures in an Annexes.
 - g. Sanjay Patel pointed out that the IEC in the short circuit document does have figures in the definition.
 - h. Christoph Ploetner indicated that the IEC will be removing figures from definitions in the future.
 - i. Kevin Juchem offered that we are not creating new definitions so best may be to retain same approach as before.
 - j. Trent Williams commented that the IEEE Dictionary can have multiple definitions for the same term, and we might be re-inventing the wheel.
 - k. Ewald Schweiger asked if there was further discussion. None being offered, the motion was voted on and approved.

16) Topic 2 – Changes in content

- Kevin Juchem reviewed several sections, (5.4, 6.3, 9, 10 and 12)
 - 1) Section 5.4 – Suggest this to move to surge coordination.
 - 2) Section 6.3 – Suggest updating the nameplate section.
 - 3) Section 9 – suggest updating the Controls systems.
 - 4) Section 10 – Should be referenced in Standard.
 - 5) Section 12 – PST modes for low flow .
 - a. Suggest Annex A for other solutions such as ARS (Advance Retard Switch).
 - b. Suggest Annex B for figures/other etc.

- Audience participated in considerable discussion after presentation.
- Audience Discussion Details:
 - 1) Joe Watson commented discussion was all good.
 - 2) Sanjay Patel asked is the ARS switch patented? Is Maschinenfabrik Reinhausen the only manufacturer? If so, should not be in guideline and suggest Tom Prevost should be consulted.
 - 3) Ewald Schweiger requested of audience if anyone would investigate if ARS were patented.
 - 4) Joe Watson indicated he did not believe it is patented but may need a release letter to mention it.
 - 5) Sanjay Patel asked if he (Joe) was sure.
 - 6) Ewald Schweiger said he would lead point of investigation on Patent or Trademark.
 - 7) Trent Williams indicated that ARS can be mentioned but there is a procedure to follow.
 - 8) Mike Thompson commented that the main concern is you cannot write a standard to give a monopoly. Think of other ways to do the same thing. Also possible is a letter of assurance is obtained indicating the technology is made available you can.
 - 9) Sanjay Patel was skeptical about how available the technology is if it is single sourced.
 - 10) Ewald Schweiger repeated his call to audience to assist in checking on this. Sebastian Rehkopf took the task to investigate the status. Also, stated that the precaution taken was to move the ARS out of the Standard and into the Guide.
 - 11) Kevin Juchem indicated that the guide describes a functionality and use in a product, it is not users fault that only one manufacturer makes this.
 - 12) Ewald Schweiger asked group if any concerns to move items as proposed by Kevin Juchem.
 - 13) Mike Thompson suggested that control systems section should still be removed as it needs to be updated, modernized and improved.
 - 14) Joe Watson stated that nameplates need to have PST specific information added and included in document.
 - 15) Kevin Juchem also preferred to have additional information in the guide.
 - 16) Alexander Kraetge stated that updates to testing may be difficult when IEC and IEEE base lines are a little different.
 - 17) Luc Dorpmans reminded audience that the history of the guide was before the standard was developed so there may be some concerns and now is opportunity to work things out.
 - 18) Joe Watson indicated testing guide would be helpful to include information on some things that need to be done a little different in field vs. factory such as temporary test bushings etc. versus the actual procedures in the standard.
 - 19) Mike Thompson indicated anything factory testing should be in the standard, but commissioning testing in the field may be useful in a guide.
 - 20) Joe Watson reiterated that there is much factory testing which cannot be repeated in the field.
 - 21) Sanjay Patel indicated this can be true for other transformers, so why make distinction for PST?
 - 22) Kevin Juchem stated in the special PST testing guide, the first document uses lots of "shall" statements. The "shall" term should not be used in guides.
 - 23) No motions were presented, and no further discussion was had. The chair then moved forward with meeting status and next steps.

17) Status, and next steps

- Feedback from PRC Committee meeting on TF and status on PAR SG C37.245 Protection guide (Michael Thompson).
- Update PAR to new title: Technical guideline for the Application, Specification and Testing of Phase-Shifting Transformers.
- Continuation of review and collection of your feedback.

18) Old Business

- None

19) New Business

- Joe Watson recommended that same people work on Guide and Standard to keep best alignment of both documents.

20) Adjournment

- Meeting adjourned at 2:43pm.

21) Next meetings (planned):

- Virtual meeting – might be scheduled before October 2025.
- In-person meeting F25 – October 19-23, 2025 in Bonita Springs, FL.

Respectfully submitted,

Ewald Schweiger – WG Group Chair

Richard von Gemmingen – WG Secretary

List of attendees for this meeting:

Last name	First name	Company / Affiliation	Status
Antosz	Stephen	Consultant	G
Beaudoin	Jason	Weidmann Electrical Technology	G
Calitz	David	Siemens Energy	G
Colopy	Craig	Retired	G
Crockett	Janet	Fayetteville PWC	G
Czernorucki	Marcos	Hitachi Energy	G
Davis	Eric	Consultant	M
Dorpmanns	Luc	Royal SMIT Transformers B.V.	M
Foster	Patrick	NextEra Energy	G
Goglia	Slaven	Koncar Power Transformers Ltd	G
Gustavsson	Niklas	Hitachi ABB Power Grids	M
Hamoir	Didier	Transformer Protector Corp	G
Janakiraman	Balaji	Virginia Transformer Corporation	G
Jang	Donghyun	LS Electric	G
Jarosz	Patrycia	IEEE SA	G
Jeong	Chanmin	HD Hyundai	G

Juchem	Kevin	Hitachi Energy	M
Kaineder	Kurt	Trench Austria	M
Kasonga	Mick	Oncor Electric	G
Kim	Heonsu	LS Electric	G
Kraetge	Alexander	Omicron Electronics	G
Lopes	Ricardo	Efacec Transformers	G
Magela junior	Geraldo	Siemens Energy	G
Mendez Zamora	Omar	Prolec GE	M
Mikulecky	Filip	Koncar Power Transformers Ltd	G
Munoz	Martin	Orto de Mexico	G
Musgrove	Ryan	OG+E	M / Chair PTSC
Natale	Anthony	HICO America	G
Neild	Kris	Megger	G
Orozco	Eduardo	GE Grid Solutions	G
Park	Dean	Hyosung HICO	G
Patel	Sanjay	TD-Smit Transformers	M
Ploetner	Christoph	Siemens Energy	M
Rehkopf	Sebastian	Maschinenfabrik Reinhausen GmbH	M
Saeed	Rana	Attendee	G
Sarkar	Amitabh	Virginia Transformer Corporation	G
Schindler	Stefan	Maschinenfabrik Reinhausen GmbH	G
Schrammel	Alfons	Siemens Energy	M
Schwartz	Danny	Quality Switch	G
Schweiger	Ewald	Siemens Energy	M / Chair
Segovic	Dario	Koncar Power Transformers Ltd	G
Simon	Preston	Electrical Technologies	G
Singh	Amitkumar	Con Edison Company of New York	G
Sohail	Muhammad Abdullah	Trench Canada	G
Solano	William	Voltyx	G
Stank	Markus	Maschinenfabrik Reinhausen	M
Stechschulte	Kyle D	AEP	M
Thomas	Scott	Hitachi Energy	G
Thompson	Michael	SEL Engineering Services, Inc.	M
Torchia	Leonard	PSE&G	G

Viereck	Karsten	Maschinenfabrik Reinhausen	G
Vir	Dharam	Prolec GE Waukesha	G
von Gemmingen	Richard	Dominion Energy	M / Secy
Watson	Joe	JD Watson and Associates Inc.	M
Weisensee	Matthew	Pacificorp	M
White	Joe	Power Engineers	G
Williams	Trenton	Advanced Power Technologies	M
Zhou	AnnaBelinda	JST Power	G

WG for the Revision of C57.12.10

IEEE Standard Requirements for Liquid-Immersed Power Transformers

3:15 p.m. – 4:30 p.m. Central Time, Monday, March 24, 2025

Hyatt Regency Denver, Denver, Colorado, USA

Unapproved Meeting Minutes

TF Chair Scott Digby called the meeting to order at 3:15 p.m., Monday, March 24, 2025. As this was the second meeting of this new WG, the vice-chair role has not yet been established or filled. WG Secretary is Juan Castellanos.

Total Attendance was:	83
Members	33
Guests requesting Membership:	14
Guests not requesting membership:	36

The total WG membership stands at 60, so quorum was achieved. The meeting attendance list is included at the end of these minutes.

A proposed meeting agenda was presented by the WG Chair, a motion to approve the agenda was made by Mr. Eduardo García, seconded by Mr. John K. John, with no changes the agenda was approved. The minutes from the previous meeting in Saint Louis were presented as well, a motion to approve the minutes was made by Mr. Richard von Gemmingen, seconded by Mr. Eduardo García, with no comments or changes the minutes were approved. Attendance rosters were circulated. The WG Chair made the requisite Call for Patents and there was none noted by those present. The WG Chair presented the IEEE-SA Copyright Policy slides as well as the IEEE-SA activity participant behavior slides.

During the meeting, the chairman explained that although the PAR expires Dec.31, 2028, the standard expires Dec.31, 2027, therefore the group will look to have the work done in 2026 and go for SA balloting in 2027.

The results of the survey on the circulated draft 1 of the standard were presented. In total, 32 comments were received (16 editorial and 16 general or technical). The editorial comments will be solved through general cleanup, but the intention of the meeting is to focus on the general and technical ones.

Of the 16 general or technical comments, 12 were discussed during the meeting according to the following resolutions based on the comment number from working Spreadsheet:

1.- To revise first column of Table 1, delete: “Rated base kVA < 833 kVA single-phase”, since this range is out of the scope of the standard.

5.- Set up a small group to study this topic (OLTC in the HV): Richard Von Gemmingen, John K, John and Thomas Keels.

6.- DGA monitor valves as optional in Table 4 is already in clause 5, to be specified by the user.

8.- To include provisions in table 4 for adding additional radiators as an option. To write this section down by a small group to study this topic: Saramma Hoffman, Thomas Keels.

11.- To use “sidewall” as proper term.

12.- To add a DETC enclosure as an option to the text.

13.- leave clause as it is.

16.- leave clause as it is.

18.- The chairman will look for someone to help with this point.

19.- Accepted, to add “operating” after liquid.

20.- To include “One SPR per each liquid filled compartment, i.e. the LTC compartment.”

24.- Change wording, use “splices” instead of “intermediate terminations”. Refer to control cabinet standard.

The remaining technical comments to be solved in the next meeting in Bonita Springs, FL in October 2025.

There being no new business, the meeting was adjourned.

Respectfully Submitted,

Juan Castellanos, Secretary WG

First Name	Last Name	Affiliation	Requested membership?
Saramma	Hoffman	PPL	Member
Ryan	Musgrove	OG&E	Member
Rodrigo	Ronchi	Weg-Voltran	Member
Gabriel	Delgado	Invenergy	Member
John	John	Virginia Transformer	Member
Anthony	Natale	Hico America	Member
Didier	Hamoir	Transformer Protector Corp.	Member
Matthew	Webb	GE Vernova	Member
Juan	Castellanos	Prolec GE	Secretary
Giles	Bargone	FISO	Member
Scott	Digby	Duke Energy	Chair
Peter	Zhao	Hydro One	Member
William	Boettger	Consultant	Member

Garret	Bradshaw	Howard industries	Member
Sami	Debass	EPRI	Member
Sunny	Swarna	Virginia Transformer	Member
Tim	Dappen	Cargill	Member
Scott	Thomas	Hitachi Energy	Member
Ashwini	Labh	Hitachi Energy	Member
Alireza	Gorzin	Black and Veatch	Member
Will	Elliot	ACP/SWEPCO	Member
Thomas	Keels	Keelectric Engineering	Member
Kayland	Adams	Prolec GE - Waukesha	Member
Shankar	Nambi	Bechtel Energy	Member
Jason	Snyder	First Energy	Member
Kyle	Stechschulte	AEP	Member
Martín	Muñoz	Orto de Mexico	Member
Garret	Sarkinen	Xcel Energy	Member
Jason	Beaudoin	Weidmann	Member
Eduardo	García	Siemens Energy	Member
Luc	Loiselle	Tetra Tech	Member
Sebastian	Renhopf	Machinenfabrik Reinhausen	Member
Richard	Von Gemingen	Dominion Energy	Member
Wilerson	Calil	Hitachy Energy	Y
Jesus M.	Perez	Prolec	Y
Ricardo	Castro Lopes	Efacec	Y
Muhammad	Sohail	Trench Group	Y
Markus	Stank	Machinenfabrik Reinhausen	Y
Jasim	Khan	Georgia Tech	Y
Jose Luis	Machain	Prolec	Y
Sudip	Chanda		Y
Hossein	Nabi-Bidheni	Engineer	Y
Manan	Pandya	Siemens Energy	Y
Salahuddin	Shaikh	NRG	Y
Amifkumar	Singh		Y
Komelabhar	Lalchem		Y
Polo	Orozco	GE	Y
Craig	Colopy	Retired from Eaton	N
Roberto	Da Silva	Machinenfabrik Reinhausen	N
Mike	Craven	Qualus Power Service	N
Park	Dean	Hyosung - HICO	N
Daniel	Obregon	TTE Transformers	N
Andrew	Steineman	Delta Star	N
Dan	Schwartz	Quality Switch	N
Drew	Welton	Intellirent	N
Mark	Tostrud	Dynamics Ratings	N
Miguel	Fernandez	Beld	N
Jimmy	Smith	Howard	N

Jonathan	Stanffer	USBR	N
Franjo	Keleman	Siemens Energy	N
Kyungchan	An	Hyosung	N
Eric	Elson	SDGE	N
Hyounggon	Ryu	HD	N
Troy	Tanaka	Burns & McDonald	N
Thomas	Propts	Dominion Energy	N
Phil	Hopkinson	HVOLT	N
Perry	Reeder	Quantas	N
Ronny	Doerr	SGB-Smit Group	N
David	Burlo	Xcel Energy	N
Onome	Avanoma	Onthoole	N
Randy	Roberts	Southern Co.	N
Landen	Kuan	NRC	N
Sheila	Ray	NRC	N
Zachary	Yin	Sieyuan	N
Alex	Zeigher	Hitachi Energy	N
Marcus	Scheffer	Meta	N
Bill	Griesacker	Consultant	N
Andreas	Kurz	Reinhausen	N
Hector	Garza	Orto	N
Asam	Yu	SEEC	N
Matt	Chu	SEEC	N
James	Norton	Oncor	N
Joe	Watson	Consultant	N



Working Group C57.140 Meeting

Spring 2025 Meeting

Centennial H, Denver, CO

Monday, March 24th, 2025

3:15PM – 4:30 PM Mountain Time Zone

Chair: Marcos Ferreira Vice-Chair: Jeremiah Bradshaw Secretary: Traci Hopkins

UNAPPROVED MINUTES

SUMMARY:

Meeting started at 15:17. In Fall 2024 there was a TF meeting which approved a Title and Scope for going to PAR; however this did not match the information in the PAR. This is the first meeting for the WG of C57.140. There were a total of 69 attendees (40 Members & 29 Guests). Volunteers were identified for Task Force leads and members to review overlapping documents and present their findings at the Fall 2025 meeting. Meeting adjourned at 15:48.

MINUTES:

- Topic: Call For Patents
 - No participants spoke up about patent claims.
 - Topic: IEEE copyright policy
 - Displayed and Discussed
 - Topic: Title, Scope & Purpose
 - Title, Scope & Purpose were not sent to PAR with the proper wording that was voted on by the TF members; PAR to be resubmitted with correct information. ○ Based on the previous Task Force meeting's notes, the following needs to be changed in the PAR request.
 - Title: Guide for Life Extension of Liquid Immersed Power Transformers and Reactors
 - Scope: This document provides guidelines to assist the user in extending the useful life of liquid immersed Power Transformers and Reactors.
 - Additional notes, change the title and scope term of "Liquid-Immersed" to "Liquid-Filled".
 - Stephanie (AVO): In the current draft of C57.12.80 that will be going to ballot soon, the definition for liquid type transformers also states "liquid-filled" and "liquid-immersed (not preferred)". Therefore we should use "liquid-filled"
- Comment from Weijun Li (C57.12.80 was approved by IEEE SA Standards Board in December 2024 and will soon be published. Replaced the term of liquid-immersed with liquid-type. The terms of liquid-immersed and liquid-filled are retained as synonyms. The term of "preferred"/"not preferred" has been removed.)*
- Topic: Task Forces for review of other related documents
 - The C57.140 officers will work with IEEE SA to obtain the current draft documents of the following:
 - C57.93 (use the current published version)

- C57.125 (get a draft from WG)
- C57.143 (get a draft from WG/this document was approved by IEEE SA Standards Board in December 2024; will soon be published)
- C57.152 (get a draft from WG)
- C57.170 (get a draft from WG/this document is going to ballot soon)
- C57.637 (get a draft from WG)
- Task Force 1: C57.152 Review
 - Dominic Pollaro (NASS) [TF Lead]
 - Jeffrey Oakley (NASS)
- Task Force 2: C57.170
 - Diego Robalino (Megger) [TF Lead]
 - Evgenii Ermakov (Hitachi)
- Task Force 3: C57.125
 - Salahuddin Shaikh (NRG) [TF Lead]
 - Juan Ortiz (Reinhausen)
- Task Force 4: C57.637
 - Ed Tenyenhuis (Hitachi) [TF Lead]
- Task Force 5: C57.143
 - Emilio Morales (Qualitrol) [TF Lead]
 - Derek Hollrah (Burns & McDonnell)
- Task Force 6: C57.93
 - Marcos Ferreira (FEMA) [TF Lead]
 - Mickel Saad (Hitachi)
 - Jonathan Sinclair (Black and Veatch)
 - Salahuddin Shaikh (NRG)
 - Jesse Duffy (Nashville Electric Service)

ATTENDANCE RECORD:

- Total of 69 attendees (40 Members & 29 Guests)
- Attendance was taken using QR code
- Spreadsheet of participants below.

NEXT IN-PERSON MEETING:

- To be held during Fall PES Transformers Committee Meeting October 19-23, 2025 in Bonita Springs, FL, USA

ACTION ITEMS:

- Officers:
 - Contact IEEE SA for a PAR modification to include the correct Title and Scope.
 - Email to IEEE SA for obtaining the current draft working version of relevant documents for review.
 - Email the WG with clarification on the conflicts between the title and scope presented and what was agreed upon at the Fall 2024 meeting.
 - Possibly a vote will be presented for the change.
- Task Force Leads:
 - Establish meetings with necessary participants to review the assigned documents for comparison.

What is your first name?	What is your last name?	What is your affiliation?	Membership Status
Marcos	Ferreira	FEMA	Chair
Paul	Boman	Hsbi&i	Guest
John	Bule	None	Guest
Olivia	Cordova	Bureau of Reclamation	Guest
Egui	Espitia	Reinhausen Manufacturing Inc	Guest
Kyle	Feaster	Xcel Energy	Guest
Lorne	Gara	Shermco Industries	Guest
James	Gardner	Prolec-GE Waukesha	Guest
Joshua	Garner	RESA Power	Guest
Attila	Gyore	MIDEL and MIVOLT Fluids Ltd	Guest
Jean Carlos	Hernandez-mejia	NEETRAC - Georgia Tech	Guest
Bernard	LaBean Jr	Consumers Energy Company	Guest
Libardo	Lopez	Hitachi Energy	Guest
Geraldo	Magela Júnior	Siemens-Energy	Guest
Jinesh	Malde	MIDEL & MIVOLT FLUIDS INC.	Guest
Toni	Mellin	Vaisala	Guest
Omar	Mendez Zamora	Prolec	Guest
Logan	Merrill	OMICRON	Guest
Juan	Ortiz	Reinhausen Manufacturing	Guest
Crystal	Qiao	Trench Canada	Guest
Diego	Robalino	Megger	Guest
Nithin	Satheesh	Trench Limited	Guest
Alan	Sbravati	Hitachi Energy	Guest
Sunny	Swarna	Virginia Transformer Corporation	Guest
Charles	Sweetser	Omicron	Guest
James	Thompson	T &R Service	Guest
Eduardo	Tolcachir	TTE Transformers	Guest
Leon	White	Hedrich North America	Guest
William	Whitehead	MR	Guest
Jeffrey	Wright	Duquesne Light	Guest
Thomas	Aikens	Delta Star	Participating Member
Mario	Alonso	Georgia Transformer	Participating Member
Piotr	Blaszczyk	Specialty Transformer Components	Participating Member
Luiz	Cheim	Hitachi	Participating Member
James	Cross	Kinectrics AES	Participating Member
Jesse	Duffy	Nashville Electric Service	Participating Member
Evgenii	Ermakov	Hitachi Energy	Participating Member
Brad	Greaves	Weidmann Electrical Technology, Inc.	Participating Member

Niklas	Gustavsson	Hitachi Energy	Participating Member
Roger	Hayes	GE Vernova	Participating Member
Ronald	Hernandez	Doble Engineering	Participating Member
Derek	Hollrah	Burns & McDonnell	Participating Member
Laszlo	Kadar	Laszlo & Associates	Participating Member
Dmitriy	Klempner	Southern California Edison	Participating Member
Mario	Locarno	Doble engineering	Participating Member
Stephanie	Mabrey	Avo Diagnostics	Participating Member
Kumar	Mani	Duke Energy	Participating Member
Emilio	Morales-Cruz	Qualitrol	Participating Member
David	Murray	TVA	Participating Member
mark	newbill	Hitachi	Participating Member
Mike	Nolte	Kiewit	Participating Member
Jeffrey	Oakley	Member	Participating Member
Anastasia	OMalley	Consolidated Edison Co NY	Participating Member
Dominic	Pollaro	NASS	Participating Member
John	Pruente	APC construction llc	Participating Member
Patrick	Rock	American Transmission Company	Participating Member
Mickel	Saad	Hitachi Energy	Participating Member
Alaor	Scardazzi	Siemens Energy	Participating Member
Salahuddin	Shaikh	Transformer SME at NRG Energy Inc	Participating Member
Jonathan	Sinclair	Black and Veatch	Participating Member
Ed	Tenyenhuis	Hitachi energy	Participating Member
Mark	Tostrud	Dynamic Ratings	Participating Member
Cole	Van Dreef	American Transmission Co.	Participating Member
Dharam	Vir	Prolec GE	Participating Member

Stephen	Vullo	GE Vernova	Participating Member
Joe	White	POWER Engineers	Participating Member
Deanna	Woods	PTT	Participating Member
Traci	Hopkins	H2scan	Secretary
Jeremiah	Bradshaw	Bureau of Reclamation	Vice-Chair

Power Transformers Subcommittee
Working Group Report

Document #: C57.125

Document Title: Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors

Chair:	<u>Hakan Sahin</u>	Vice-Chair	<u>Thomas Melle</u>
Secretary	<u>Adam Sewell</u>	Percent Complete	<u>100%</u>

Current Draft Being Worked On: 1.0 Dated: February 2025

PAR Expiration Date: December 31, 2025

Meeting Date: March 24, 2025 Time: 4:45pm – 6:00pm

Location: Denver, CO, USA

Attendance: Members	32 of 49
Guests	<u>74</u>
Guests Requesting Membership	<u>(20)**</u>
Total*	<u>106</u>

* Attendance list for this meeting is shown at end of meeting minutes

Because WG approved to send draft to ballot, no new WG Members will be added. Member list as of Spring 2025 meeting is final WG list

Meeting Minutes / Significant Issues / Comments:

Meeting was called to order at 4:45pm, March 24, 2025 at Hyatt Regency Denver.

1. Administrative
 - a. IEEE Patent Policy and Call for Patents
 - i. No comments from group
 - b. IEEE SA Copyright Policy
 - i. No comments from group
 - c. Review of agenda
 - i. No comments from group
 - d. Reminder on the purpose and the scope of the working group, and the timeline
 - i. The expectation from this WG is to review and update the document as it expires on 12/31/2025.
 - ii. Projected Completion Date for Submittal to RevCom: Dec 2025
 - e. Introductions of the attendees
 - i. Attendance was taken by QR Code sign-in...no paper attendance sheets were passed out.

- ii. Name/affiliation was announced as attendees spoke during the meeting.
 - f. Updated membership review and count for quorum
 - i. 49 members and 29 were counted as present via hand count.
 - 1. QUORUM ACHIEVED
 - ii. *Attendance list after meeting completed showed 32 members attended.*
 - iii. Members are expected to attend and stay in the meeting so business can be conducted.
 - iv. Because WG approved to send draft to ballot, no new WG Members will be added. Member list as of Spring 2025 meeting (with 49 members) is final member list
 - g. Approvals of previous minutes and agenda:
 - i. Approval of the agenda for Spring 2025
 - 1. MOTION to approve Spring 2025 agenda – D.Murray, 2nd – F.Mills
 - 2. No objection to unanimous approval – MOTION APPROVED
 - ii. Approval of the Fall 2024 unapproved meeting minutes
 - 1. MOTION to approve Fall 2024 unapproved meeting minutes – A.Sarkar, 2nd – D.Schwartz
 - 2. No objection to unanimous approval – MOTION APPROVED
2. Old Business
- a. Draft 1.0 was emailed to the 49 WG members before the Spring 2025 meeting and was voted on electronically.
 - i. 41 members responded (85% response)
 - ii. 35 approved with no comments
 - iii. 3 abstained
 - iv. 3 approved with comments, making it 38/41 approval (93%)
 - v. Zero disapproved
 - b. Member comments from the Draft 1.0 email vote were reviewed in the S25 meeting
 - i. Comment from Weijun Li: Definition of Compressive Force: If I remember correctly, the WG voted to use definition from C57.164 but it appears that it remains unchanged in the updated document. Could you please double check?
 - 1. Chair's response: Weijun is correct. The circulated document did not have the compressive force definition updated as it was approved during Spr_24 meeting:

During the Spring 2024 meeting changes below were approved

a.

Definition for compressive force

- i. MOTION made by A.Sarkar, 2nd – M.Saad to use definition from C57.164
 - 1. Vote was unanimously approved with 1 abstention

Existing Definition: (A) The force that presses the inside coil toward the core. (B) The force attraction that presses coils wound in opposite directions together in a set of pancake coils.

2. Definition within C57.164 for compressive force will be put in the document by Chair before being sent to ballot:
- ii. Comments on Draft 1.0 from Anastasia O'Malley:
 1. In section 5.3.2.2 Other hazards, suggest adding an additional bullet point, - Chemical hazards: There are hazards associated with touching transformer oil and other dielectric liquids. Direct contact can cause skin irritation and potentially other health problems. Always wear appropriate PPE.
 2. In section 5.4.4 Internal inspection of main tank and LTC, in the

compressive stress: Inward stresses on windings, spacers, conductor paper, insulation and pressure rings (or pressure plates) due to radial forces resulting in tangential compressive stress. Also applied to interphase wedges in shell form transformers.

4th paragraph, on line 852, suggest adding a sentence before the last sentence: ... air at a safe positive pressure. Note that if the combustible gas content above the oil is excessive (> 0.5% by volume), an intermediary purge, where the displaced oil is followed by tested, dry nitrogen may be recommended. Appropriate precautions need to be taken regarding PCB contamination in....

- iii. Comments on Draft 1.0 from Sanjib Som:
 1. Line 466 -468, page 6 – that a spiral winding has no key-spacer between turns should be mentioned. A helical winding is a spiral winding with key-spacers between turns.
 2. Lines 469-472 , page 6 – they can be connected in series as well (Siemens does). It is inaccurate to presume that it cannot be used for the higher side voltage. We can discuss more if there is a need.
 3. 21000 Annex E, page 79 – if this blank, please delete

3. New Business

- a. The chair announced that since the PAR expires at the end of 2025, the WG will most likely not have enough time to resolve all comments and get the document approved before the PAR expires, a PAR extension should be requested.
 - i. MOTION – To have the chair make a motion at the PTSC to request a 1 year PAR extension to start the ballot process no later than Fall 2025 meeting - by B.Forsythe, 2nd – P.Panesar
 - ii. After some discussion of the MOTION, an amendment was made:
 - iii. AMMENDMENT - To have the chair make a motion at the PTSC to request a 2 year PAR extension to start the ballot process no later than Fall 2025 meeting – by S.Som, 2nd – F.Mills
 1. No objection to unanimous approval – AMENDMENT APPROVED
- b. MOTION To have the chair request at the PTSC for the ballot process to start as soon as possible by June 2025 at the latest by A.Sarkar, 2nd – S.Som
 - i. No objection to unanimous approval – MOTION APPROVED
- c. MOTION To form a comment resolution group and give them the authority to resolve editorial issues and comments where consensus is reached by the CRG. If any of the comments cannot be resolved to a consensus point, they will be brought back to the Working Group for Resolution by P.Panesar, 2nd – D.Schwartz
 - i. No objection to unanimous approval – MOTION APPROVED

- ii. 11 CRG volunteers announced during the meeting:
 - 1. S.Debass, B.Forsyth, E.Garcia, W.Li, T.Melle, F.Mills, R.Musgrove, T.Raymond, H.Sahin, A.Sarkar, A.Sewell
 - 2. J.Yun volunteered to be part of CRG after meeting adjourned
 - 4. Next meeting: October, 20, 2025 at the Fall 2025 Transformers Committee Meeting scheduled for October 19-23, 2025, Bonita Springs, FL, USA.
 - 5. Close of meeting
 - a. Meeting adjourned at 5:45pm
- Submitted by: Hakan Sahin Date: 4/11/25

March 24, 2025 Meeting Attendance (RM = Request Membership - Because WG voted to send draft to ballot, no new WG Members will be added. Member list as of Spring 2025 meeting is final WG list):

LAST NAME	FIRST NAME	COMPANY/AFFILIATION	Role
Abbas	Mubarak	Virginia Transformer	GUEST
Adams	Kayland	Prolec-GE Waukesha	GUEST
Betancourt	Enrique	Prolec ge	MEMBER
Boettger	William	Boettger Transformer Consulting LLC	MEMBER
Botti	Michael	Hyosung HICO	GUEST-RM
Bradshaw	Jeremiah	Bureau of Reclamation	GUEST
Calil	Wilerson	Hitachi Energy/Member	GUEST-RM
Chanda	Sudip	Delta Star Inc.	GUEST-RM
Chu	Matt	Shihlin Electric	GUEST
Crockett	Daniel	Ameren	MEMBER
Crockett	Janet	Fayetteville PWC	GUEST
Cross	James	Kinectrics	GUEST-RM
Da Silva	Roberto	Maschinenfabrik Reinhausen	GUEST
Debass	Sami	EPRI	MEMBER
Dillon	Nikolaus	Dominion Energy	MEMBER
Draper	Zachary	Delta-X Research	MEMBER
Dulac	Hakim	Advanced Power Technologies	MEMBER
Elson	Eric	San Diego Gas and Electric	GUEST
Fausch	Reto	RF Solutions	GUEST
Fernandez	Miguel	Braintree Electric Light Dept.	GUEST-RM
Foata	Marc	MR	GUEST
Forsyth	Bruce	Cargill	MEMBER
Garcia	Eduardo	Siemens Energy	MEMBER
Garner	Joshua	RESA Power	GUEST
Garza	Héctor	Orto de México	GUEST
Goglia	Slaven	Koncar Power Transformers Ltd.	GUEST
Gorzin	Alireza	Black & Veatch	MEMBER
Greaves	Brad	Weidmann Electrical Technology, Inc	GUEST
Hall	Jesse	VTC	GUEST
Hampton	Kevin	Siemens Energy	GUEST
HOLLRAH	DEREK	Burns & McDonnell	GUEST
Jang	Donghyun	LS ELECTRIC	GUEST
Jones	Braxton	SD Myers	GUEST
Keels	Thomas	kEElectric Engineering PLLC	GUEST-RM
Kelemen	Franjo	Koncar Power Transformers Ltd.	GUEST
Khan	Qasim	Neetrac-Georgia Tech	GUEST
kim	dalho	iljin electric	GUEST
Kim	Yeousoo	JST Power Equipment	GUEST-RM
Klempner	Dmitriy	Southern California Edison	GUEST-RM
Koshel	Anton	Delta Star Inc	GUEST
Kurz	Andreas	Maschinenfabrik Reinhausen	GUEST
Kwai	Yeboah	GE Vernova	GUEST-RM
Labh	Ashwini	Hitachi Energy	GUEST-RM
Li	Weijun	Braintree Electric Light Department	MEMBER
Loiselle	Luc	Tetra tech	GUEST
Lopes	Ricardo	Efacec	GUEST
Lugge	Andrew	Hitachi Energy	GUEST
Machain	Jose Luis	Prolec GE	MEMBER
Mamede	Gabriel	Siemens Energy	GUEST-RM
Mani	Balakrishnan	Delta star Field service	GUEST-RM
MELLE	TOM	HIGHVOLT	MEMBER
Mellin	Toni	Vaisala	GUEST
Merrill	Logan	OMICRON	GUEST

LAST NAME	FIRST NAME	COMPANY/AFFILIATION	Role
Mills	Francis	POWER Engineers	MEMBER
Montanha	Juliano	Siemens Energy	MEMBER
Morales-Cruz	Emilio	Qualitrol	MEMBER
Munoz	Martin	Orto de México	GUEST
Munoz	Marta	Hitachi Energy	GUEST-RM
Murray	David	TVA	MEMBER
Musgrove	Ryan	Oklahoma Gas & Electric	MEMBER
Obregon	Daniel	TTE Transformers	GUEST
O'Malley	Anastasia	consolidated Edison Co of NY	MEMBER
Orozco	Eduardo	GE Vernova Grid Solutions	GUEST-RM
Ortiz	Juan	Reinhausen Manufacturing	GUEST
Pandya	Manan	Siemens Energy	GUEST-RM
Panesar	Parminder	Virginia Transformer Corp	MEMBER
Park	Jaeyong	LS Electric	GUEST
Pedro	Pedro	Efacec Energia	GUEST-RM
Rato	Nuno	Efacec	GUEST
Raymond	Timothy	Inductive Reasoning	MEMBER
Reyes perez	Juan	Hitachi energy	GUEST
Ryu	Hyounggon	HD hyundai electric	GUEST
Saad	Mickel	Hitachi Energy	MEMBER
SAHIN	HAKAN	GEORGIA TRANSFORMER	MEMBER
Sanchez rodriguez	Jesus	Vertiv	GUEST-RM
Sarkar	Amitabh	Virginia Transformer Corporation	MEMBER
Schaffer	Marcus	Meta	GUEST
Schrammel	Alfons	Siemens Energy	GUEST
Schwartz	Dan	Quality Switch	MEMBER
Segovic	Dario	Koncar Power Transformers Ltd.	GUEST
Sethi	Kabir	Hitachi Energy Germany Ag	GUEST-RM
Sewell	Jeremy	Quality Switch, Inc.	GUEST
SEWELL	ADAM	QUALITY SWITCH	MEMBER
Sexton	Aron	Kinectrics	GUEST
Shaikh	Salahuddin	NRG Energy Inc	GUEST-RM
Sinclair	Jonathan	Black and Veatch	GUEST
Singh	Amitkumar	Con Edison Company of New York	GUEST-RM
Snyder	Jason	FirstEnergy	GUEST
SOM	SANJIB	PTT, LLC	MEMBER
steele	Hampton	TVA	GUEST
Sweetser	Charles	OMICRON electronics Corp. USA	GUEST
Szczecowski	Janusz	Maschinenfabrik Reinhausen GmbH	MEMBER
Tan	Jonathan	Northern Transformer	GUEST
Vedantham	Aparna	Virginia transformer corporation	GUEST
VonGemmingen	richard	Dominion Energy	MEMBER
Vullo	Stephen	GE Vernova	GUEST
Wagner	John	AEP	GUEST
Wallace	David	Mississippi State University	GUEST
Washburn	Alan	Burns & McDonnell	MEMBER
Whitehead	William	Reinhausen	GUEST
Woods	Deanna	PTT	MEMBER
Wright	Jeffrey	Duquesne Light	GUEST
Xie	Jiahao	S&C Electric Company	GUEST
YU	ZACHARY	SIEYUAN ELECTRIC COMPANY	GUEST
Yun	Joshua	Virginia Transformer Corp	MEMBER
Zibert	Kris	Allgeier Martin	GUEST

Power Transformers Subcommittee Working Group Report

Document #: C57.157

Document Title: Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid-Immersed Transformers

Chair: Adam M. Sewell Vice-Chair: N/A

Secretary: Piotr Blaszczyk Percent Complete: N/A

Current Draft Being Worked On: N/A Dated: N/A

PAR expires 12/31/2027

PAR Expiration Date: Std expires 12/31/2025

Meeting Date: 25 March 2025 Time: 8:00am-9:15am

Location: Denver, CO, USA

Attendance: Members	11 of 18
Guests	23
Guests Requesting Membership	(4)
Total*	34

* Attendance list for this meeting is shown at end of meeting minutes

Meeting Minutes / Significant Issues / Comments:

1. Meeting was called to order at 8:00am, March 25, 2025 at Hyatt Regency Denver at Mineral Hall A (3rd Floor).
2. Presentation of Agenda
3. Presentation of IEEE Standards Slides
 - a. Call for Patent Claims & Copyright Notice
 - b. No comments from working group about any patent claims or copyright notice
4. Distribution of attendance sheets
 - a. Attendance was taken by QR Code sign-in...no paper attendance sheets were passed out.
 - b. Please send an email to adamsewell@ieee.org with the subject: C57.157 EMAIL to be added to the C57.157 email list
5. Checking the Quorum – 18 members so 10 needed for quorum.
 - a. 11 out of 18 members were in attendance of the meeting so quorum was achieved.

6. Approval of the Spring 2025 Agenda and Fall 2024 Meeting Minutes.
 - a. MOTION was made by D.Schwartz and 2nd by M.Newbill to approve Spring 2025 Agenda.
 - i. No opposition to unanimous approval of the MOTION – APPROVED
 - b. MOTION was made by J.Sewell and 2nd by D.Schwartz to approve Fall 2024 Meeting Minutes.
 - i. No opposition to unanimous approval of the MOTION - APPROVE
7. Chair announcements
 - a. Current guide is set to expire December 31, 2025
 - b. This group was to determine work needed for this standard and create a PAR for revision if needed. Par was created after the Spring 2023 meeting and has PAR Approval Date of 05 Jun 2023 and expiration of 31 Dec 2027.
8. Old work
 - a. Request was made to share previous presentations that were used to develop this guide
 - i. Chair posted previous presentations and 2015 C57.157 standard on IEEE Collabratec and IEEE TC Power Transformer Subcommittee pages
 - ii. Chair presented background information on this guide during the S24 meeting by showing one of the presentations that is available on IEEE Collabratec.
 - b. Members of this group were tasked to review current guide and previous presentations before Spring 2025 meeting and make suggestions as to what recommendations they have for this guide
 - c. Attila Gyore (Midel) presented at the F24 meeting in St. Louis on topic of synthetic esters
 - i. History of synthetic ester liquids
 - ii. Chemistry of synthetic ester liquid and how is it different to mineral oil and natural ester liquids
 - iii. Standards that apply to synthetic ester liquid (IEEE, ASTM and IEC)
 - iv. Material compatibility
 - d. Presentation was made by F. Faur of his observations of the current guide at S24 meeting:

Summary

The purpose of the test described in C57.157 is to verify if the contacts of a tap changer would perform adequately over 30 years of its life.

The test makes the simplification hypothesis that the contact life depends on the thermal runaway due to the increased resistance of the contact points. The main conclusion after this test is that Ag-Ag contacts perform better than any other combination, and Sn plated contacts perform the worst.

While this is true, it is not the only practical option to mitigate the problem of overheating, and not the only cause of overheating. Also, the number of other causes that can trigger a contact failure is so high, that performing the test in every condition is impractical. Having passed the test in one configuration doesn't guarantee that the same contact or even switch will pass the test in another configuration.

Comments

(in the comments below, when I mention contact, I am referring to the entire body of a stationary or a moving contact, as opposed to the contact point as the sum of A-spots between 2 contacts)

1. Trapped hot oil
Sometimes, either the tap changer manufacturer or the transformer manufacturer adds extra barriers to

increase dielectric strength. In this case, the hot oil created by the contact would keep overheating, accelerating the contact failure.

2. Different coefficient of thermal expansion

A long moving contact that operates close to its thermal capabilities, would thermally expand differently than the insulating material that separates the stationary contacts. That makes the contact points move slightly every time the temperature changes. Each time the contact moves, it breaks new areas of oxidation that accumulate around the contact points, increasing the electrical resistance and preventing oil cooling. The longer the contacts, the more predominant is this phenomenon.

3. Number of cycles

The test exclusively assesses the deleterious effects of the contacts' prolonged exposure to high temperatures, disregarding the cycle count in a heavy-duty switch application. In some of the documentation from the time the test was developed, it was *observed that most failures were in peaking, pulsing loads: Rectifier Loads, Motor Starting Loads, Furnace Supplies, or Emergency Generator Transformers*. No failures were observed *in utility transformers or units that had more "homogenized" loads*. That means that an increased number of cycles might be more important than the current, temperature, and time itself.

4. Operating the tap changer

If a contact point is Ag-Cu, then, by operating it several times, part of the silver from AG contacts is smeared over the blank Cu contact. For this reason, pure Ag-Cu contacts don't exist.

5. Oil properties

Transformer oil can have different properties that affect contact cooling, gas generation, coke formation, etc. The transformer manufacturer decides what oil to use. I am not referring to structural differences like mineral vs. ester vs. silicone oils. I am referring to subtle differences like additives in the oil, inhibited vs. non-inhibited oil, etc. All those small changes may, among other things, affect oil thermal breakdown and the formation of film deposits and increase contact point resistance.

6. Spring force

Sometimes the springs in the contacts lose their compression force in a longer time than the 30 days of testing, leading to contact failure. The test would pass a contact that would fail in the real world with the same symptoms.

7. Insufficient contact section

The heat generated by the contact point itself couldn't be eliminated properly. Sometimes, just increasing the cross-section of the contact could solve the heat problem.

8. Cable & Cable lug heat sink

The section of the cables and cable lugs and the insulation over the cable affect the elimination of heat from the contacts, or they can even contribute to heating the contacts.

9. Water, gases, and contaminants

The test doesn't address the possible presence of water or gases in oil and their effect on the oxidation and aging of the oil. Those can affect the behavior of contacts at elevated temperatures more than the temperature itself.

10. Oxygen concentration

The oil behaves differently if the tank is sealed, has a nitrogen blanket, has a conservator, or is free breathing.

From the above observation, I think that this test has a similar kind of performance prediction ability to the standard temperature rise test from C57.131, but using more harsh conditions (longer test and higher temperature).

Slightly related to the above, in the standard C57.131 I think that it would be beneficial if we could add some comments about the testing conditions: the amount of oil, distance to the walls and oil surface, the length of cables in the oil, the thermal insulation of the tank, dielectric barriers, etc.

9. New Work

a. Synthetic ester testing

- i. Jeremy Sewell highlighted that the previous version of the document did not include testing in synthetic esters so he proposed the formation of a task force to perform testing of this guide standard using synthetic esters.
- ii. W.Li shared his experience and observations with the team regarding corrosive sulfur sticking to silver contacts, leading to the blackening of these contacts.
 1. T.Tillery also confirmed the same observation on copper as well as silver-plated contacts
- iii. There was a general consensus in the working group that there may be a relation between synthetic esters, corrosive sulfur, and blackened contacts - which would be good to explore by testing.
- iv. Quality Switch (D.Schwartz) and Specialty Transformer Components (P.Blaszczyk) volunteered for their companies to work on setting up/performing testing using Synthetic Esters. T.Tillery also volunteered to support the testing by consultation.

b. The chair announced the desire to create a draft 1.0 to review before the Fall 2025 meeting

- i. Need any input from members on recommended changes / adds / deletes to current guide standard before the Fall 2025 meeting.

10. Next meeting: October 21, 2025 at Fall 2025 Transformers Committee Meeting scheduled for October 19-23 in Bonita Springs, FL, USA.

11. Close of meeting

- a. Meeting adjourned at 8:35am

Submitted by: Adam Sewell Date: March 26, 2025

Meeting Attendance March 25, 2025 (RM = Request Membership):

LAST NAME	FIRST NAME	COMPANY/AFFILIATION	ROLE
Blaszczyk	Piotr	SPECIALTY TRANSFORMER COMPONENTS	MEMBER
Brodeur	Samuel	Hitachi	GUEST
Colopy	Craig	Retired from Eaton	GUEST
Cruz Valdes	Juan Carlos	PROLEC GE	MEMBER
Faur	Florin	Prolec-GE	MEMBER
Fernandez	Miguel	Braintree Electric	GUEST
Galindo	Yazmin	Quality switch	GUEST
Gamboa	Jose	H-J Family of companies	GUEST
Grandbois	Luke	IFD Technologies	GUEST
Greaves	Brad	Weidmann Electrical Technology, Inc	GUEST
Gustavsson	Niklas	Hitachi Energy	GUEST-RM
Heiden	Kyle	Eaton	GUEST
Hopkinson	Philip	HVOLT Inc.	GUEST
Koinis	Nicholas	CenterPoint Energy	GUEST
Labh	Ashwini	Hitachi Energy	GUEST-RM
Li	Weijun	Braintree Electric Light Department	GUEST
Machain	José Luis	Prolec GE	GUEST
Mantoan	Francis	Siemens Energy	GUEST
Merrill	Logan	OMICRON	GUEST
Musgrove	Ryan	Oklahoma Gas & Electric	GUEST-RM
newbill	mark	Hitachi	MEMBER
PEREZ	MARCELINO	PROLEC	GUEST-RM
Prunte	John	APC Construction llc	GUEST
Rehkopf	Sebastian	Reinhausen Germany	MEMBER
Reyes	David	Oncor	GUEST
Rossini	Yuri	Siemens Energy	GUEST
Schwartz	Dan	Quality Switch	MEMBER
Sewell	Adam	Quality Switch	MEMBER
Sewell	Jeremy	Quality Switch, Inc.	MEMBER
Solano	William	Voltyx	MEMBER
Szczechowski	Janusz	Maschinenfabrik Reinhausen GmbH	GUEST
Tillery	Timothy	Howard Industries	MEMBER
Vullo	Stephen	GE Vernova	GUEST
Whitten	Christopher	Hitachi Energy	MEMBER

IEEE PES Transformer Committee Working Group Meeting Minutes

PC57.170 for Condition Assessment Guide

Tuesday, March 25, 2025

09:45 – 10:30 AM

Centennial “D, E” – Hyatt Regency Hotel – Denver, CO

Chairman: Kumar Mani Vice Chair: James Cross Acting Secretary: James Cross

1. Welcome & Introduction: The meeting was called to order at 9:30 am CDT by the Chair.
2. Attendance and Establishment of Quorum: There were 37 of 63 voting members present by head count. There were 94 guests. Quorum was established.
3. Call was made for Patent Disclosures: No claims were made.
4. IEEE Copyright Policy: The Chair presented the IEEE Copyright Policy slides.
5. Approval of Meeting Agenda: The agenda of the meeting was presented by the chair. Trent Williams moved to accept the agenda. Marcos Ferreira seconded. Carried unanimously.
6. Approval of Fall 2024 Minutes: Amitabh Sarkar moved to accept minutes of St. Louis Fall 2024 meeting. Seconded by Mickel Saad. Carried unanimously.
7. IEEE SA Initial Ballot Comment Resolution Report: Saramma Hoffman informed the group that there were 172 comments of which 37 were technical in nature, and the remaining ones were editorial. All comments were successfully resolved after 13 CRG virtual meetings.
8. Next Steps: PAR Extension Until Dec 31, 2026. The current PAR expires at the end of 2025.
 - b. Patrycia recommended that we apply for a PAR extension at this meeting to have it in-hand rather than waiting for the fall meeting. A motion was moved by Poorvi Patel. Ali Naderian seconded.
 - c. Stephanie Mabry recommended that it may be a valid risk-avoidance strategy to secure a PAR extension while we have a quorum present.
 - d. After many discussions, it was decided to not apply for a PAR extension since the document is ready for circulation and re-balloting now. Poorvi Patel modified her original motion to include this. Scott Reed seconded the amended motion.
 - e. Trent suggested that the CRG be authorized to resolve any further comments to the re-balloted document. Ryan Musgrove remarked that the Minutes from the Fall 2023 meeting showed that the WG already voted on establishing a CRG and empowered them to resolve any comments, so the amended motion is a moot point. After this clarification, there was no further discussion on this topic.
9. Next Steps: Ballot Circulation. Discussion from Joshua Yun from Virginia Transformer- Will only the WG members be allowed to comment on the recirculated ballot?

The Chair remarked that as per IEEE SA Ballot rules, only those who participated in the original ballot can do so in the recirculation ballot. This was confirmed by Patrycja.
10. Unfinished / New Business: Th Chair called for any new / unfinished business. Having heard none, Trent Williams moved to adjourn the meeting which was seconded by Stephanie Mabry. Carried unanimously.

Meeting was adjourned at 1005 Hrs.
11. Next Meeting: Bonita Springs, FL. Oct 19-23, 2025.

ATTENDANCE ROSTER

First Name	Last Name	Affiliation	Member / Guest
Jean Noel	Berube	Rugged Monitoring	G
Enrique	Betancourt	Prolec GE	M
Paul	Boman	Hartford Steam Boiler	G
Piotr	Bloszczyk	Transformer Components	G
Jeremiah	Bradshaw	BOR	M
Wilkerson	Calil	Hitachi Energy	G
Camilo	Callasar	Trench Group	G
Sudip	Chanda	Virginia Transformer Corp.	G
Luiz	Cheim	Hitachi Energy	M
James	Cross	Kinectrics Inc.	M/VC
Roberto	Da Silva	Reinhausen	G
Sami	Debass	EPRI	G
Zack	Draper	Delta X	M
Hakim	Dulac	Qualitrol	M
William	Elliot	AEP-SWEPCO	G
Evgenii	Ermakov	Hitachi Energy	M
Marco	Espindola	Hitachi Energy	M
Todd	Felton	AVO Diagnostics	G
Miguel	Fernandez	Beld	G
Marcos	Ferriera	FEMA	M
Florin	Faur	SPX Transformer Solutions, Inc.	G
Alan	Fujimori	Romagnole	G
Lorne	Gara	Felus	G
Eduardo	Garcia Wild	Siemens Energy	M
James	Gardner	Prolec GE Waukesha	G
Slaven	Goglia	Siemens Energy	G
Bill	Greaves	Weidmann	G
Attila	Gyore	M&I Materials	G
Roger	Hayes	GE Vernova	G
Saramma	Hoffman	PPL	M
Phil	Hopkinson	HIVOLT	G
Brexton	Jones	SD Myers	G
Patrcyza	Jarosz	IEEE	G
Thomas	Keels	kEElectric Engineering PLLC	G
Dimitriy	Kelmpner	SCE	M
Andreas	Kurz	Reinhausen	G
Weijun	Li	Braintree Electric Light Department	M

Cesar	Lizcano	Shell	G
Luc	Loiselle	Tetrattech	G
Ricardo	Lopes	EFACEC	G
Stephanie	Mabrey	AVO Diagnostics Services	M
Jinesh	Malde	M&I Materials	M
Balakrishna	Mani	Delta Star	G
Kumar	Mani	Duke Energy	M/C
Evan	Manning	Clearwater Energy	G
Logan	Merill	Omricon Energy	G
Toni	Mellin	Vaisala	G
Emilio	Morales Cruz	Qualitrol	M
Ryan	Musgrove	OG&E	M
Ali	Naderian	Potencia	M
Mark	Newbill	Hitachi Energy	G
Shane	Oakley	NASS	G
Anastasia	O'Malley	ConEd	G
Juan	Ortiz	Reinhausen Manufacturing	G
Poorvi	Patel	EPRI	M
Pedro	Pedro	EFACEC	G
Nick	Perjanik	AVO Diagnostics	G
Verena	Pellon	FPL	G
Tim	Peterson	Nomos Systems / North American Substation Services	G
John	Pruente	APC Construction	M
Gerard	Puleo	Midel	G
Tim	Raymond	EPRI	M
Scott	Reed	MVA	M
Sebastian	Rehkopf	Reinhausen	G
Diego	Robalino	Megger	G
Antonio	Robles	USBR	G
Chris	Rutledge	GE Vernova	G
Mickel	Saad	Hitachi Energy	M
Amitabh	Sarkar	Virginia Transformer Corp.	M
Alan	Sbravati	Hitachi Energy	M
Alaor	Scardazzi	Siemens Energy	G
Stephan	Schindler	Reinhausen	G
Salahuddin	Shaikh	NRG	G
Michael	Sharp	Trench Group	G
Hemant	Shertukde	University of Hartford	M
Jonathan	Sinclair	PPL Electric Utilities	M
Amitkumar	Singh	Consolidated Edison Company of New York	G

Jason	Snyder	First Energy	G
Marcus	Stank	Reinhausen	G
Charles	Sweetser	Omricon Energy	M
James	Thompson	SVTV	G
Mark	Tostrud	Dynamic Ratings	M
Dharam	Vir	Prolec Energy	M
Dominique	Violette	Nomos Systems	G
Alan	Washburn	Burns & McDonnell	M
Drew	Welton	Intellirent	G
Peter	Werelius	Megger	G
Stephan	Wirth	Coil Innovation	G
Joe	White	Power Engineers	M
Trenton	Williams	Advanced Power Technologies	M
Deanna	Woods	Quanta Services	G
Jeffrey	Wright	Duquesne Light	M
Kwasi	Yeboah	GE Vernova	M
Joshua	Yun	Virginia Transformer	M

Working Group Meeting for IEEE Standard PC57.17

Denver, Colorado, USA Meeting – March 25th, 2025 11:00-12:15 pm MST

Chair: Jason Varnell Secretary: Trenton Williams

1. The meeting was called to order at 11:00 AM MST.
2. There were 29 active participants present, which consisted of 13 of the 22 members. Quorum was achieved.
3. Three (3) participants requested membership and one participant denied due to attendance, two participants were granted membership due to attendance. Therefore, the new membership total after the S25 meeting is 24.
4. The chair reviewed the IEEE patent slides and the group made no patent claims.
5. The chair reviewed the copyright policy with the group.
6. A motion was made by Dan Sauer (Eaton) and seconded by Mark Newbill (Hitachi Energy) to approve the Spring 2025 meeting agenda. There were no objections to unanimous approval of the agenda. A motion was made by Sanjib Som (PTTI) and seconded by Dan Sauer (Eaton) to approve the Fall 2024 St. Louis Working group meeting minutes. There were no objections to unanimous approval of the Fall 2024 St. Louis working group meeting minutes.
7. **Old Business:** Review and resolve comments from Jerzy Kazmierczak from previous meeting:
 - a. Subclause 4.2 comment was resolved by adding a note to Table 4 for clarification on units rated greater than 100kVA. Sanjib Som (PTTI) volunteered to provide this language to the officers prior to the next WG meeting.
 - b. Clause 5 Comment resolved also by adding a similar note to Tables 5 & 6 which will also be provided by Sanjib.
 - c. Subclause 6.1 comment review.
 - i. Motion made by Dan Sauer (Eaton) and seconded by Jason Beaudoin (Weidmann) to strike lines 9 through 15 of subclause 6.1. Discussion followed. Motion Failed.
 - ii. Dan Sauer (Eaton) makes a motion to accept the proposed wording of “The furnace transformer impedance is determined based upon the following conditions”. Sanjib Som (PTTI) seconded and motion passed with unanimous approval.
8. **New Business:**
 - a. The Chair reviewed with the group the previously submitted straw ballot comments as time permitted. The working group agreed to resolutions to the first 15 of 36 comments.
 - b. It was determined that the additional 21 comments that had not been visited during the meeting will be handed to the previous TF leaders (see below) for review and revision. The document will then be recirculated for additional review of these changes.
 - i. **Clause 4: Ratings**
 1. Dan Sauer (Eaton Corporation), Jason Beaudoin (Weidmann), Sheldon Kennedy (Consultant).
 - ii. **Clause 7: Connections**
 1. Sanjib Som (Pennsylvania Transformer), Emilio Morales (Qualitrol) and Thrinadha Katapalli (Virginia Transformers).
 - iii. **Clause 8: Testing**
 1. Jason Varnell (Doble Engineering).
 - iv. **Clause 9: Construction**
 1. Sanjib Som (Pennsylvania Transformer)
 - v. **Annex A – DC Arc Furnace**
 1. Dan Sauer (Eaton Corporation) and Jerzy Kazmierczak (Hitachi Energy).
 - vi. **Annex C – Replacement and Remanufacturing of Low Voltage Bus Bars**
 1. Jason Beaudoin (Weidmann) and Jason Varnell (Doble Engineering).
 - vii. **Annex E - High Temperature Insulation Application (including Fiber Optics)**
 1. Gilles Bargone (FISO) and Emilio Morales (Qualitrol).
9. The next working group meeting will be in Bonita Springs, FL, USA during the Fall 2025 Transformers Committee Meeting.
10. The meeting adjourned at 12:15 PM MST.

Attendance Record:**Status as of****3/25/2025****(Prior to S25****Meeting)**

	Last Name	First Name	Affiliation
Member	BARGONE	GILLES	FISO
Member	BEAUDOIN	JASON	WEIDMANN
Member	BOETTGER	WILLIAM	BOETTGER TRANSFORMER CONSULTING LLC
Guest	COLOPY	CRAIG	CONSULTANT
Guest	FAUR	FLORIN	PROLEC-GE WAUKESHA
Member	GORZIN	ALIREZA	BLACK & VEATCH
Member	KENNEDY	SHELDON	SHELDON KENNEDY ENGINEERING PLLC
Guest	KOWALSKI	RAFAL	HITACHI ENERGY
Guest	LUGGE	ANDREW	HITACHI ENERGY
Guest	MENDEZ	OMAR	PROLEC-GE
Member	MORALES-CRUZ	EMILIO	QUALITROL
Guest	MURCIA	FREDY	SIEMENS ENERGY
Member	MUSGROVE	RYAN	OG&E
Member	NEWBILL	MARK	HITACHI ENERGY
Member	SAUER	DAN	EATON
Member	SOM	SANJIB	PTTI
Guest	TENYENHAUS	EDWIN	HITACHI ENERGY
CHAIR	VARNELL	JASON	Doble Engineering Co.
SECRETARY	WILLIAMS	TRENTON	ADVANCED POWER TECHNOLOGY
Member	WHITTEN	CHRISTOPHER	HITACHI ENERGY
Guest	ZEIGHER	ALEX	HITACHI ENERGY
Guest	QUINONES	MANUEL	GE VERNOVA
Guest	MACHAIN	JOSE LUIS	PROLEC GE
Guest	ORTIZ	JUAN	REINHAUSEN
Guest	KADAR	LASZLO	LASZLO & ASSOCIATES
Guest	BHARDWAJ	NAVEEN	TRENCH GROUP
Guest	SZCZECHOWSKI	JANUSZ	REINHAUSEN
Guest	LOPEZ	LIBARDO	HITACHI ENERGY
Guest	NOLTE	MIKE	KIEWIT

Working Group – 60076-57-1202

Chair: Ewald Schweiger

60076-57-1202

IEC/IEEE International Standard Power Transformers Part 57-1202:

Liquid immersed phase-shifting transformers

- 1) Meeting started at 1:45 PM (CDT) on Tuesday March 25th.
- 2) This was the second meeting as WG (Working Group).
 - Attendance: 46
 - Members: 12
 - Guests: 34
- 3) Call for patents & Copyright statement
 - The slides on essential patents from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.
→ No essential patents or issues were reported.
 - The slides on IEEE copyright policy from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.
→ No issues were reported.
 - The slides on “Participant behavior in IEEE-SA activities is guided by the IEEE Codes of Ethics & Conduct” have been presented
- 4) Establish quorum
 - A quorum was achieved.
 - Total number of members is 14 requiring 8 members for quorum.
 - 12 members were present establishing quorum.
- 5) Approval of agenda
 - a) Motion to approve agenda was made by Markus Stank and second by Luc Dorpmanns.
No discussion or objections were made.
 - b) Motion was carried unanimously with no objections or abstentions.
- 6) Approval of meeting minutes of the previous Virtual meeting on October 29th, 2024
 - a) The Meeting Minutes were posted on the [PTRC website](#).
 - b) Motion to approve agenda was made by Christoph Ploetner and second by Sebastian Rehkopf.
No further discussion or objections were made.
 - c) Motion was carried unanimously with no objections or abstentions.
- 7) Kevin Juchem and Ewald Schweiger have refreshed the Dual Logo and IEC status
 - At the IEC TC 14 Plenary session held in Rome, Italy, in April 2024, a decision was made to establish a Maintenance Team (MT) designated 'phase-shifting transformers' with the responsibility 'to upkeep the standards pertaining to phase-shifting transformer projects.' Consequently, MT 60076-57-PST was formed to undertake the revision of standards IEC/IEEE 60076-57-1202 and IEC/IEEE 60076-57-135, with Kevin Juchem being named the convener.
 - Kevin Juchem updated on the global composition of the IEC team.
 - Ewald Schweiger emphasized that this development streamlines the harmonization between IEC and IEEE standards for this particular document.

- 8) Kevin Juchem reported on the progress of the Working Group (WG) at CENELEC concerning the standard EN IEC/IEEE 60076-57-1202:2025, including Amendment A11:
- The vote by the national committees was positive (100%), leading to its scheduled implementation at the national level.
 - Additional information: A single editorial remark was made: The angle brackets surrounding in Paragraph 3.20 should be eliminated.
- 9) Mike Thompson, the liaison from the Power Systems Relaying and Controls Committee (PSRC), provided an update on the status of C37.245 (IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers).
- The PSRC convened in January and considered revising C37.245 concurrently with IEC/IEEE 60067-57-135.
 - The subcommittee concurred on establishing a task force to aid in updating the PST Guide/Standard.
 - The PSRC is scheduled to meet again in May and September of this year.
 - The May gathering will be the first occasion to create a PAR (Project Authorization Request) study group for C37.245.
 - The update concluded, and the floor was opened for discussion among the members; however, no discussions or questions ensued.
- 10) Luc Dorpmanns presented a review of definitions from the Standard and the guide.
- The plan to move forward is to keep and use the definitions from the standard and use this in guide. No change in the standard (60076-57-1202).
- 11) Kevin Juchem presented the review of the content and suggested two changes
- 1) Annex B – Behavior of a phase shifting transformer with non-symmetrical fault currents
Due it is informative to move this to the guide.
 - 2) Annex F – Additional information on advanced retard switch
Due it is informative to move this to the guide.
- 12) Planned next steps
- a. *Please Continue to review* and look for duplication, errors, corrections needed and improvements (Standard posted – PTSC site).
Volunteers are requested to reach out to the ones who took over tasks and / or officers.
 - b. Collection of feedback (via email)
- 13) The meeting was adjourned at 2:15 PM (MDT)
- 14) Next meetings (planned):
- Virtual meeting – might be scheduled before October 2025.
 - In-person meeting F25 – October 19-23, 2025 in Bonita Springs, FL.

Respectfully submitted,
Ewald Schweiger - WG Chair

List of attendees for this meeting on the next page

List of attendees for this meeting:

Last Name	First name	Affiliation	Status
An	Kyungchan	Hyosung	G
Antosz	Stephen	Consultant	G
Beaudoin	Jason	Weidmann	G
Berube	Jean-Noel	Rugged Monitoring Quebec Inc	G
Bhattiprolu	Prudhvi Anand	AES	G
Brodeur	Samuel	Hitachi	G
Cai	Jim	JSHP transformer	G
Calitz	David	Siemens Energy	G
Colopy	Craig	Retired from EATON	G
Czernorucki	Marcos	Hitachi Energy	G
Dorpmanns	Luc	Royal SMIT Transformers	M
Espitia	Wguu	Reinhausen Manufacturing Inc	G
Fedor	Ken	SGB-Smit Group	G
Foster	Patrick	NextEra	G
Hamoir	Didier	Transformer Protector Corporation	G
Hampton	Kevin	Siemens Energy	G
Heiden	Kyle	Eaton	G
Jeong	chanmin	HD Hyundai	G
Juchem	Kevin	Hitachi Energy Germany AG	G
Kaineder	Kurt	TRENCH	G
Lopes	Ricardo	Efacec	G
Magela junior	Geraldo	Siemens-Energy	G
Mendez Zamora	Omar	Prolec	G
Merrill	Logan	OMICRON	G
Murcia	Fredy	Siemens Energy	G
Musgrove	Ryan	Oklahoma Gas & Electric	M / Chair PTSC
Neild	Kris	Megger	G
Padmanaban Iyer	Ashwin	STP	G
Patel	Nitesh	Hyundai Power Transformers	G
Patel	Sanjay	Royal Smit Transformers	M
Pellon	Verena	FPL NextEra	G
Ploetner	Christoph	Siemens Energy	M
Rehkopf	Sebastian	Reinhausen Germany	M
Schrammel	Alfons	Siemens Energy	M
Schweiger	Ewald	Siemens Energy	M / Chair
Shannon	Michael	Rea Magnet Wite	G
Shertukde	Hemchandra	UHART	G
Stank	Markus	Maschinenfabrik Reinhausen	M
Thompson	Michael	SEL Engineering Services	M
Torchia	Leonard	PSE&G	G
Vermeulen	Harrie	Royal Smit Transformers	G
Vir	Dharam	PROLEC GE	G

Washburn	Alan	Burns & McDonnell	M
Watson	Joe	JD Watson and Associates	M
Weisensee	Matt	PacifiCorp	M
White	Jor	POWER Engineers	G

WG Guide for Installation and Maintenance of Power Trf C57.93

Tuesday, March 25th, 2025

3:15 – 4:30 PM

Hyatt Regency, Centennial G (3)

Denver, CO

Chairman: Scott Reed

Vice Chairman: Alwyn VanderWalt

Secretary: Kyle Stechschulte

The meeting was called to order at 3:15 pm by Chair Scott Reed. This is the second meeting for this Working Group. The current guide expires 12/31/2029. The PAR for this WG expires 12/31/2028.

Chairman posted the Patent Claim and Copyright slides. No notifications or comments were received.

The Working Group has 50 current members and required 26 members be present to achieve a quorum. 72 guests and members were in attendance, 27 members and 45 guests achieving a quorum. There were 2 guests requesting membership that met attendance requirements. Membership was granted to the following guests:

Juan Carlos Cruz Valdes

Marcos Ferreira

A motion was made by Marcos Ferreira and seconded by Ewald Schweiger to approve the agenda. It was unanimously approved by the working group.

A motion was made by Ewald Schweiger and seconded by Ryan Musgrove to approve the Fall 2024 meeting minutes. It was unanimously approved by the working group.

The chair shared the title and scope as approved for the PAR.

The 7 task force leaders presented progress to the group:

TF1 Shipping and Assembly—Ryan Musgrove

TF2 Vacuum Processing Methods—Kyle Stechschulte

TF3 Final Testing and Energization—Elizabeth Bray; WG Chair Scott Reed and TF member Mario Locarno presented progress on behalf of TF Chair Elizabeth Bray due to her absence.

TF4 Relocation and Field Repair—Alwyn VanderWalt; WG Chair Scott Reed presented progress on behalf of TF Chair Alwyn VanderWalt due to his absence. WG Chair also called for volunteers to join this TF as there were no TF members other than Alwyn VanderWalt

TF5 Maintenance—Weijun Li

TF6 Storage—Pat Rock

TF7 Editorial and Definitions—Jesse Duffey

The Chair called on the task force leaders to report back progress for the fall meeting. The next WG meeting will be in Bonita Springs, FL in October 2025.

The meeting was adjourned at 4:15 p.m.

First Name	Last Name	Affiliation	Member
Jason	Beaudoin	Weidmann	
Prudhvi Anand	Bhattiprolu	AES	
Jeremiah	Bradshaw	Bureau of Reclamation	Member
sudip	chanda	Delta Star Inc	Member
Matt	Chu	Shihlin Electric	
Juan Carlos	Cruz Valdes	PROLEC GE	New Member
Gabriel	Delgado	Invenergy	Member
Jesse	Duffy	Nashville Electric Service	Member
Orozco	Eduardo	GE Vernova Grid Solutions	
Miguel	Fernandez	Braintree Electric	
Marcos	Ferreira	FEMA	New Member
Lorne	Gara	Shermco	Member
Miguel	Garcia	Hitachi Energy	
Slaven	Goglia	Koncar Power Transformers Ltd.	
Brad	Greaves	Weidmann Electrical Technology, Inc	
Niklas	Gustavsson	niklas.gustavsson@hitachienergy.com	
Roger	Hayes	GE Vernova	Member
Portillo	Homer	Advanced Power Technologies	
Braxton	Jones	SD Myers	
Laszlo	Kadar	Laszlo & Associates	
Mick	Kasonga	Oncor	
Thomas A.	Keels	kEElectric Engineering PLLC	Member
Sheldon	Kennedy	Sheldon P Kennedy Engineering PLLC	
Yeoundoo	Kim	JST power equipment	Member
Landen	Kwan	NRC	
Bernard	LaBean Jr	Consumers Energy Company	
ANDREW	LAWLESS	Potencia Partners	
Lance	Lewand	Doble	
Weijun	Li	Braintree Electric Light Department	Member
José Luis	Machain	Prolec GE	Member
Geraldo	Magela Junior	Siemens-energy	
Jinesh	Malde	MIDEL & MIVOLT fluids Inc.	
Balakrishnan	Mani	Delta star field service	Member
Logan	Merrill	OMICRON	

David	Murray	TVA	Member
Ryan	Musgrove	Oklahoma Gas & Electric	Member
Mike	Nolte	Kiewit	
Anastasia	Omalley	Con Edison NY	
Juan	Ortiz	Reinhausen Manufacturing	
Parminder	Panesar	Virginia Transformer Corp	Member
Rakesh	Patel	Hitachi Energy	
Poorvi	Patel	EPRI	
Nirav	Patel	Yash Highvoltage Ltd	
Pedro	Pedro	Efacec Energia	Member
Verena	Pellon	FPL and NextEra	
Nuno	Rato	Efacec	
Sheila	Ray	US Nuclear Regulatory Commission	
Scott	Reed	Mva	Member
David	Reyes	Oncor	
Diego	Robalino	MEGGER	Member
Randy	Roberts	Southern Company	
Antonio	Robles	Bureau of Reclamation	
Patrick	Rock	American Transmission Company	Member
Mickel	Saad	Hitachi Energy	
Alan	Sbravati	Hitachi Energy	
Alaor	Scardazzi	Siemens Energy	Member
Stefan	Schindler	Maschinenfabrik Reinhausen	
Ewald	Schweiger	Siemens Energy	Member
Jonathan	Sinclair	Black and Veatch	
Tommy	Spitzer	Self employed	Member
Kyle	Steckschulte	AEP	Member
H. Allen	Steele	TVA	Member
David	Stockton	SBC	Member
Charles	Sweetser	Omicron	
Jonathan	Tan	Northern Transformer	Member
Troy	Tanaka	Burns & McDonnell	Member
Clifton	Thompson	RMS Energy	
John	Wagner	AEP	
Matthew	Webb	GE VERNOVA	
William	Whitehead	Reinhausen	
Eva	Zarco	Yash	
Kris	Zibert	Allgeier Martin	Member

Unapproved Meeting Minutes

PC57.153 WG Guide for Paralleling Regulating Transformers

Minutes from March 25, 2025 – Denver Meeting

Officers

Chair – Mark Tostrud

Vice Chair – Cihangir Sen

Secretary – Zan Kiparizoski

1. Call to Order

The meeting was called to order at 4:45 PM on March 25, 2025

2. Chairs Remarks

After the officer's introduction, couple of changes to the previously sent agenda were noted. These changes include the addition of the modified example under item 4.4, as proposed by Zan Kiparizoski. Members and guests were also informed that the previously sent, non-approved meeting notes from the Fall 2024 meeting contained a minor typo in the name of Francis Mills under section 5. This error has been corrected in the revised meeting minutes.

2.1 Essential Patent Claims

IEEE SA slides related to the Essential Patent Claims were reviewed. The Chair provided an opportunity to identify any patent related claim. No claims were made.

2.2 Copyright Policy

IEEE slides related to Copyright Policy were reviewed. No copyright issues were raised.

2.3 Participant Behavior

IEEE slides related to participant behavior in the individual working group/task force process were reviewed. There were no comments.

3. Attendance

- There were 35 attendees in the meeting
 - 15 members were present
 - 2 guests requested membership
- Quorum check

- Quorum was achieved, 15 of 21 members were present

4. Approval of the agenda and minutes from the last task force meeting

4.1. Meeting Agenda

As noted in the chair's remarks, modifications were made to the emailed agenda and the non-approved minutes from the Fall 2024 meeting.

- Welcome and call to order
- QR Code Attendance Registration and Distribution of attendance rosters
- Call for Essential Patents
- Review of IEEE-SA Copyright policy
- Review of Code of Conduct Policy
- Introductions
- Review and approval of the meeting agenda
- Review and approval of the minutes from the Fall 2024 meeting
- Review of changes in the latest draft
 - Annex C was updated
 - Recommended actions during reverse power flow was added
 - Bibliography reference B.1 was removed
- Old Business
 - Use of Inclusive Language in Technical Terminology and Communications (IEEE P3400)
 - Standard is still in draft but will likely be approved before we go to ballot
 - Concerns were raised over the terminology for the "Master/Follower" parallel method
 - Discussion on how to proceed
- Are we ready for a straw ballot?
- Next Meeting(s)
 - Virtual - TBD
 - In Person – October 21, 2025 – Bonita Springs, FL
- Adjourn

4.2 Approval of the revised minutes from the last working group meeting in Fall 2024 and the revised agenda

Motion to approve the revised agenda and minutes.

- Motion by Dan Sauer
- Seconded by Francis Mills
- Unanimous approval

No objection to unanimous approval of the revised meeting minutes from Fall 2024 working group meeting and revised agenda.

5. Review and discussion of modifications to the example under 4.4.1 of the existing guide.

The discussion moved to Zan Kiparizoski's proposal to expand the current guide by adding more detailed descriptions. The proposed text was presented to the attendees for review. The existing example in the guide explains how the load is split between different transformers, and Zan's proposal builds on this by providing additional details. There was general agreement that the proposed changes would be beneficial to end users by making the information clearer and more comprehensive.

6. Old Business

6.1 Review and discussion of Reverse Power Flow section

The discussion focused on adding a section for reverse power flow, as the current guide lacks this content. An existing example shows a generator in parallel with a transformer serving a load, but it does not represent reverse power flow. The group discussed modifying sections 1.1.1, 1.1.2, and 1.1.3 in the existing draft as a foundation for the new content.

Key points included voltage control, how power flows from the generator through the transformer back into the system, and the challenge of covering all possible scenarios. It was agreed to reference these sections and add a dedicated section on reverse power flow. Several ideas were discussed, and the chair asked for a volunteer to take on the task of writing this section. The chair mentioned that Beckwith offered to help draft the section.

Dan Sauer volunteered to contribute to drafting this section. Mark Tostrud (chair) will update and distribute the latest draft to the group, including reference sections 1.1.1, 1.1.2, and 1.1.3, to serve as a base for the reverse power flow section.

6.2 Review of the draft for the Annex C , concept of the apparent circulating currents

The chair will submit the draft for Annex C, which is approximately 80% complete. Karsten Viereck has worked on this section, and once finalized, all annex documents will be compiled and distributed to the group for review. Due to the complexity of the wording and multiple formulas, it was agreed that discussing Annex C at this stage would not be an efficient use of time. Instead, the draft will be shared with guests and members for their review and comments.

6.2 Use of Inclusive Language in Technical Terminology and Communication

The final item discussed was the master-follower topic, which had been tabled during the previous meeting. It was noted that this question will not be addressed further.

7. Comments on LTC vs OLTC terminology

Craig Colopy proposed a change to use the term "OLTC" instead of "LTC." The chair noted that this topic has been discussed in the past and that the current draft uses "LTC." The chair will refer the matter to the subcommittee for a recommendation on whether to use "LTC" or "OLTC," acknowledging that about half of the relevant standards use one term and the other half use the other. Dan Sauer and Weijun Li also pointed out that the term *LTC* is defined in the latest revision of C57.12.80, which was recently approved by the IEEE Standards Board. The term *OLTC* is included as a synonym; therefore, retaining the term *LTC* in C57.153 should be acceptable.

8. New Business

No new business was identified.

9. Next Meeting

The next scheduled meeting will be at the Fall standard meetings, 2025 in Bonita Springs, FL.

10. The meeting adjourned at 5:45 PM

11. Minutes

The minutes were recorded by Zan Kiparizoski – secretary and reviewed by Mark Tostrud – Chair and John Sen Vice-chair

C57.153 – Guide for Paralleling Regulating Transformers			
Last Name	First Name	Affiliation	Role
Bargone	Gilles	FISO	Member
Bhattirolu	Prudhvi	AES	Guest
Blaydon	Daniel	Baltimor Electric	Member
Carrizales	Juan Alfredo	Prolec GE	Guest
Colopy	Craig		Guest
Elson	Eric	San Diego G&E	Guest
Espitla	Equi	MR	Guest
Last Name	First Name	Affiliation	Role
Fernandez	Miguel	Braintree Electric Light Dept.	Guest
Heiden	Kyle	Eaton	Member
Hoffman	Saramma	PPL	Member
Kiparizoski	Zan	Howard Industries	Secretary
Koinis	Nicholas	Center Point Energy	Guest
Lapointe	Sylvian	Rugged Monitoring	Guest
Li	Weijun	Braintree Electric Light Dept.	Member
Loiselle	Luc	Tetra Tech	Guest
Lopes	Ricardo	EFACEC	Guest
Machain	Luis	Prolec GE	Guest
Mills	Francis	Power Engineers	Member
Musgrove	Ryan	Oklahoma Gas&Electric	Member
Orozco	Eduardo	GE Vernova	Guest
Park	Den	Hico	Guest
Radu	Ion	Hitachi Energy	Member
Rock	Pat	American Transmission	Guest
Rossini	Yuri	Siemens Energy	Guest
Sauer	Dan	Eaton	Member
Sen	Cihangir	Duke Energy	Vice-Chair
Shertkde	Hemchandra	Uhart/Ddi	Guest
Shrammel	Alfons	Siemens Energy	Guest
Stank	Markus	Reinhausen	Guest
Tostrud	Mark	Dynamic Ratings	Chair
Viereck	Karsten	Reinhausen	Member
Vijay	Gunja	Powertech Labs	Guest
Vir	Dharam	Prolec GE	Member
William	Solano	Voltyx	Guest
Zhang	Shibao	Pcore Electric	Member

IEEE PC57.20 Entity WG Meeting Liaison Report – March 19, 2025

IEEE PC57.20 Entity Draft Guide for Power Transformers for Low-Frequency (10 – 30 Hz)
Power Transmission - Draft 1,0

The Entity Working Group met on Webex on Wednesday March 19, 2025 at 8:30 PM EDT. In attendance were Meng Zhao and Patrycja Jarosz from IEEE and Sheldon Kennedy, Steve Shull and Weijun Li representing the IEEE Transformers Committee. The Chair, Haojun Liu, called the meeting to order and went through introductions and roster attendance for a quorum. This was the second meeting of the Entity Working Group. The first meeting on February 25, 2025 apparently failed due to problems with WEBEX or understanding how to use it.

Sheldon Kennedy submitted comments to the draft prior to the meeting. Much of the draft seems to be written specifically for the China offshore windfarm power transmission projects, but that is not what the PAR states. It should be a useable standard for other parts of the world that still utilize lower frequency applications like some isolated portions of 25 Hz in the United States, as well as some traction power systems and others. In Europe, 16 2/3 Hz is sometimes used for traction power systems, as well. Most of the applications are legacy systems that have not upgraded to 60 Hz or 50 Hz.

We pointed out that many of the tables for preferred voltages and kVA ratings are not necessary as this would be an IEEE standard using IEEE C57.12.00. Also, tables specifying required sound levels, no load losses, and load losses are for China only, not for other countries. They should be noted as such or removed. Dimensional requirements seem to be specific to offshore platforms and don't seem to be required of other applications.

It was noted that the PAR should be modified to be for liquid-filled transformers.

The overall draft reads more like a specification than a guide or standard. This requires quite a few modifications.

The Chair and working group seem to not be knowledgeable of Robert's Rules of Order requirements. The chair seemed very willing to make the modifications we suggested but did not understand that he had to a motion, a second and a vote by the working group in order to make any modifications.

Completed Events

Feb. 15 th , 2024	PAR Approval
Apr. 9 th , 2024	Kick-off meeting
Feb. 11 th , 2025	Complete Draft 1.0
Mar. 20 th , 2025	Second WG meeting

Future Plan

Jun. 7 th , 2025	Complete the Draft 2.0
Jun 30 th , 2025	Third WG meeting
Mar. 8 th , 2026	Final Draft (Ballot Ready Draft)
Apr. 10 th , 2026	Mandatory Editorial Coordination (MEC)
Aug. 11 th , 2026	Initiate SA Ballot
Mar. 23 th , 2027	Submit to Review Committee (RevCom) / Final Recirculation
July. 19 th , 2027	Publication

The chair seemed to rush to adjournment, and we adjourned about 9.50 PM EDT.

Respectfully submitted,

Sheldon P. Kennedy

April 3, 2025

Standards Subcommittee

March 26 2025, Denver, CO.

Standards Subcommittee		
Chair: Daniel Sauer	Vice-Chair: Marcos Ferreira	Secretary: Ajith Varghese
Standards Coordinator: Steve Shull		
Room: Centennial Foyer (3), Hyatt Regency	Date: March 26,2025	Time: 4:30 PM to 05:15 pm
Total Members: 95	Present at time of quorum check: 55	Attended per Record: 63
Guests present: 71	Membership requested: 13	Membership accepted: 6

L.1 Meeting Attendance

The Standards Subcommittee met on Wednesday; Mar 26th, 2025, at 4:31 PM (CST).

55 members were in attendance at the beginning of the meeting, which met the quorum requirement.

Based on attendance roster and after correction to membership, it was confirmed that **63 of 95** members were present. 71 guests were also present, of which **13** guests requested membership of which **06** met attendance requirement and will be granted membership.

L.2 Chair's Remarks

The Chair welcomed members and guests to the S25 meeting. Chair briefly highlighted the requirement that while introducing one need to state their affiliation.

The agenda was moved by Eric Davis and seconded by Sanjib Som. The motion was carried with unanimous consent. The Minutes for Fall 2024 was moved by Steve Antosz and seconded by Jerry Murphy. The motion was carried with unanimous consent.

The chair presented the IEEE requirement for patent and copyrights. The Chair reminded WGs that call of the patent is required a during every WG meetings including on-line/Teleconference meeting. If there are any patent claim, it shall be noted but not discussed at the working group meetings. The chair reminded members of their membership duties to respond to surveys and ballots to maintain.

The Chair reminded the WG and TF leaders to submit their minutes from the meetings within **15 days** to the SC secretary. The SC Secretary then must submit the SC minutes within 45 days of the SC meeting.

WG on C57.12.00, C57.12.90, C57.152 and C57.133 and TF on IEEE/IEC and Reverse Power flow provided an update on status of their standards/TF.

WG Status reports:

- **WG C57.12.00:**

- Two additional changes to C57.12.00 were approved during the S25 meeting. DiTest SC approved an error correction in formula under external clearance section and Performance characteristic SC approved clarification in table 17 regarding Load loss measurement.
- WG approved motion to move the document with all approved changes to ballot.
- During Standard SC meeting, Eric Davis, WG chair moved a motion to move forward with SA ballot to revise the document. Steve Antosz seconded, and SC approved moving C57.12.00 to ballot unanimously.

- **WG C57.12.90 Test Code:**

- Three additional changes to Test code were approved during the meeting. Dielectric SC approved a change to move text related to Induced voltage test for transformer with series or multiple connection from section 10.5 Low frequency test to 10.7 Class I induce test and 10.8 Class II Induce test. Two changes to section 11 Temperature rise test was also approved by Insulation Life SC. The first one is modification of altitude correction formula so that correction can be applied in both directions. The second change involves the addition of a thermal model and formula for calculation of hottest spot rise.
- WG approved a motion to move the document with all approved changes to ballot.
- Steve Antosz, the WG chair, moved a motion to move forward with SA ballot to revise the document. Ajith Varghese seconded, and motion was approved unanimously by SC.

- **WG C57.152 Field guide:**

- The guide is in Ballot resolution and the Chair provides an update of 145 comments received. WG unanimously approved motions approving the response to ballot comment and to recirculate the ballot.

- **IEEE/IEC Cross Reference TF:**

- TF discussed the scope and format and agree to create two separate cross-linking document – one to link IEEE standard to IEC and second to cross link based on topic. TF plans to survey to get feedback to prioritize the topics to start working on.

- **WG C57.133:**

- WG held a third meeting and 5 short presentations on reverse power flow was made. WG is planning one virtual WG meeting before Florida, kickoff small task forces to begin developing draft text on reverse power flow effects.

TF Definitions of reverse power flow:

- Held two virtual meetings between St. Louis and Denver meetings and made good progress on a definition of transformer reverse power flow, developing a 4-quadrant PQ diagram that could be used in PC57.133
- TF is Planning at least one more virtual TF meeting before Florida meetings.

- **WG C57.12.80 Terminology Guide:** WG did not meet. 2024 revision of guide is waiting to be published.
- **WG C57.12.70 Terminal Markings:** Currently not active and did not meet.
- **WG C57.163 Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances:** WG is not active and did not meet.

Detailed WG/TF reports are included as part of this report (pages 5 to 43).

Other Discussions during SC:

- There was a question on who all will part of C57.12.00 and C57.12.90 ballot resolution. The chair clarified that these WG members consisting of WG or TF chair of continuous revision, who are also the CRB. David Wallach clarified that as discussed during previous meetings as well and for future , this will be further reviewed as part of next P&P manual revision.
- It was also clarified that ballot is always for entire document, not just changed approved by SC.
- There was also a question about where members of WG or TF will be recognized for their work on C57.12.00 and C57.12.90.90. Steve Antosz clarified that members list of WG and TF who provided inputs to document will not included on document but all those ballot will be present. As for recognizing with award, it's prerogative of WG chair.

L.4 Old Business

There was no old business to discuss.

L.5 New Business

No new item was discussed.

L.6 Attendance

Included as last pages of these minutes.

L.7 Adjournment

The meeting was adjourned at 4:55 PM CST.

Subcommittee New business and SC attendees list are included at end of this minutes after WG/TF reports (pages 36-37).

Respectfully submitted,
Ajiith M. Varghese
Standards SC Secretary
04/27/2025

L.3 Working Group and Task Force Reports

L.3.1 Standards Working Group on the Continuous Revision of C57.12.00

Standards Working Group on the Continuous Revision of C57.12.00
Standards Subcommittee
IEEE/PES Transformers Committee
WG Chair: Eric Davis
Spring 2025 Denver, CO; March 26, 2025

INTRODUCTION

This is a working group by committee of task forces, for continuous revision of C57.12.00. The purpose of this WG is to compile all the work being done in various TF/WG/SC's for inclusion in the continuous revision of C57.12.00 in a consistent manner. The WG exists administratively in the Standards Subcommittee and has no live meetings. The technical work is done in other subcommittees based on expertise and scope. The WG Membership consists of the people actively working on the revisions. These people are the TF Chairs, SC Chairs and other significant contributors to the current version. The WG Members are:

Dan Sauer
Poorvi Patel
Sanjib Som
Ajith Varghese
Tauhid Ansari

This WG coordinates efforts with the companion standard C57.12.90 so that they publish together.

SUMMARY

C57.12.00-2021 was approved by IEEE SA Standards Board on November 9, 2021. and published January 2022. A Project Authorization Request (PAR) for Revision of PC57.12.00 was approved May 13, 2022. It expires December 31, 2026.

Changes approved by the appropriate subcommittees by the end of the Spring 2025 meeting will be included in the next revision of C57.12.00. This will allow sufficient time to ballot and resolve any comments prior to the expiration of the existing PAR.

WG MEETING

The WG met at the beginning of the SC meeting. Five of six members were present. A quorum was present. Dan Sauer made the following motion, "I move that C57.12.00 go to Sponsor Ballot with the changes approved by the respective SCs." Ajith Varghese seconded the motion. The motion was unanimously approved.

Dan Sauer made the following motion, "I move that the WG create a Ballot Resolution Group to resolve comments received during the ballot." Ajith Varghese seconded the motion. This motion was unanimously approved.

At the SC Meeting, the SC unanimously approved the WG to begin the IEEE-SA Ballot process for the C.57.12.00 document. Please refer to the SC minutes.

FUTURE REVISIONS AND PENDING WORK

Any new material provided by the various Task Forces to this WG for inclusion in the next revision, will first be approved by the responsible technical subcommittee (Dielectric Test, PCS, Distribution, IL, etc.) and then presented to the Standards Subcommittee for the “official” vote of approval to go to ballot.

The following groups are reviewing proposed changes that may impact this standard.

- Dielectric Test SC
 - Section 6.8, Equation 3: Correct the formula replacing BIL with BSL. This change matches the original change surveyed and approved by DiTest for the previous revision. This change was approved by the SC.
- $$\text{BSL} = CFO \times \left(1 - 1.28 \times \frac{\sigma_f}{CFO} \right)$$
- TF PCS Continuous Revisions to C57.12.00 (PCS)
 - The TF discussed the following items. Please refer to the TF and SC meeting minutes for additional details.
 - Item 115: DC Current Injection Limits
 - Item 116: Add an informational note in the text regarding kVA values in Table 11. The TF and SC approved this change.

7.1.2 Transformer categories

Four categories for the rating of transformers are recognized, as shown in Table 11.

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.

Table 11 —Category of transformer ratings

Category	Single phase (kVA)	Three phase (kVA)
I ^a	5 to 500	15 to 500
II	501 to 1667	501 to 5000
III	1668 to 10 000	5001 to 30 000
IV	Above 10 000	Above 30 000
NOTE—All kVA ratings listed are minimum nameplate kVA for the principal windings.		

^aAutotransformers with equivalent two-winding kVA of 500 or less, which are manufactured as distribution transformers in accordance with IEEE Std C57.12.20 [B32], IEEE Std C57.12.23TM [B33], IEEE Std C57.12.24TM [B34], IEEE Std C57.12.34 [B35], IEEE Std C57.12.36 [B36], IEEE Std C57.12.38 [B37], or IEEE Std C57.12.40TM [B38] shall be included in Category I, even though their nameplate kVA may exceed 500.

- Item 119: Table 17 Clarify impedance voltage and load loss for Class II power transformers. The TF and SC approved this change.

Tests	Distribution transformers			Class I power transformers			Class II power transformers			Comments
	Routine	Design	Other	Routine	Design	Other	Routine	Design	Other	
Performance										
Impedance voltage and load loss at rated current and rated frequency on the rated voltage connection, and at the tap extremes of the first unit of a new design	*			*			*			These measurements shall be taken only at the rated voltage connection for a two winding unit, and at all rated voltage connections for units with three or more windings. For the Class II power transformers, at least one test shall be performed at the minimum kVA rating and one test at the maximum kVA rating. The tested load loss of duplicate transformers shall be corrected to reference temperature by assuming the same stray and eddy loss as the design test transformer. For LTC units, see 8.3.2.

- TF Revision of Impulse Tests C57.12.00 & C57.12.90 (DiTest)
 - Please refer to the TF and SC meeting minutes for details.
- TF Continuous Revisions of Low Frequency Tests (DiTest)
 - Please refer to the TF and SC meeting minutes for details.

Four changes have already been approved by the respective SC's for the next revision. These approved changes are:

1. Changes to Low Frequency Tests from Ajith Varghese's RLFT TF in the Dielectric Test SC. The final survey approved by TF and SC in the Spring 2023 meeting is shown below. Text in black is existing, red is revised, blue is added.

5.10.5.5 Induced-voltage test for Class II power transformers

With the transformer connected and excited as it will be in service, an induced-voltage test shall be performed as indicated in Figure 2, at voltage levels indicated in Columns 6 and 7 and **1.05 times the line to ground voltage per column 2 of Table 4**. Minimum line-to-ground induced test levels for Class II power transformers shall be a multiple of corresponding line-to-ground nominal system voltage as follows: 1.58 times for one-hour tests and 1.8 times for 7200 cycles enhancement level tests.

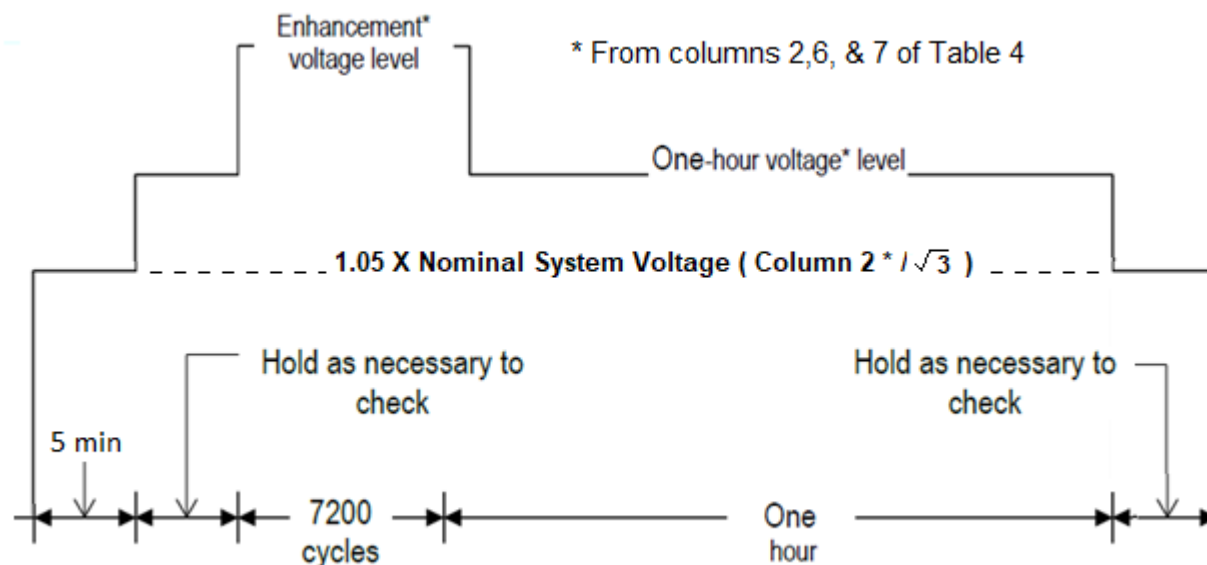


Figure 2 —Induced-voltage test for Class II power transformers

2. Changes to Measurements of Auxiliary Losses from T. Ansari's Continuous Revisions to C57.12.00 in the Performance Characteristics SC. The final survey approved by TF and SC in the Spring 2024 meeting is shown below. Text in black is existing, red is revised, blue is added.

5.9 Total losses

The total losses of a transformer shall be the sum of the no-load losses and the load losses. The losses of cooling fans, insulating liquid pumps, space heaters, and other ancillary equipment are not included in the total losses. When specified, power loss data on such ancillary equipment shall be furnished.

The standard reference temperature for the load losses of power and distribution transformers shall be defined as 20 °C plus the rated average winding rise. The standard reference temperature for the no-load losses of power and distribution transformers shall be 20 °C.

For Class II transformers (see 5.10), ~~control/auxiliary (cooling)~~ auxiliary cooling equipment losses shall be measured and recorded. All stages of cooling, ~~pumps, heaters,~~ and all associated cooling control equipment shall be energized, provided these components are integral parts of the transformer to meet guaranteed thermal performance.

Note: The auxiliary losses do not include control cabinet components including but are not limited to cabinet heaters, online DGA or ancillary devices such as dehydrate breathers, nitrogen cabinet heaters, etc.

The manufacturer to provide total power consumption of all devices on the control schematic drawing to evaluate the power supply requirements.

3. Changes to Phasor Diagrams from T. Ansari's Continuous Revisions to C57.12.00 in the Performance Characteristics SC. The motion approved by the TF and SC in the Spring 2024 meeting are shown below. The actual text from C57.12.00 is shown after the motion. Text in black is existing, red is revised, blue is added.

2. WG Item 114, Modification of Sec 5.7.2/Steve Antosz (Prolec GE)

- Proposal to add the phasor-group designation as required nomenclature for identifying the angular displacement between windings for three-phase power and distribution transformers. Std. C57.12.70 "Standard Terminal Markings and Connections" was recently revised and updated with that concept. As both standards are linked through mutual references, the proposal includes the phasor group designation be shown on the transformer's nameplate. The nomenclature is detailed in 12.70. This proposal also harmonized with IEC Stds.
- Three motions passed:
 - Motion #1: Add the following sentence at the end of the second paragraph in Subclause 5.7.2: "The phasor group designation (vector group) shall be shown on the transformer's nameplate, near the phasor diagram."
 - Motion #2: Revise existing Figure 1 to describe the phasor group designation for the four example connections given, as: Dd0, Yd1, Yy0, Dy1
 - Motion #3: Revise Table 6, Row 11 for Nameplates A, B, and C. Change "Phasor Diagram" to "Phasor Diagram and Phasor Group Designation"

Motion #1

5.7.2 Angular displacement (nominal) between voltages of windings for three-phase transformers

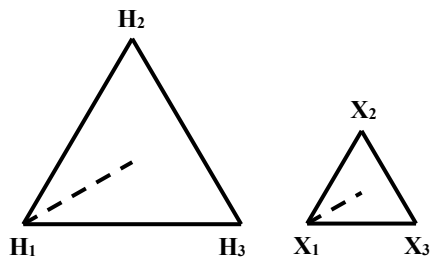
The angular displacement of a polyphase transformer is the time angle expressed in degrees between the line-to-neutral voltage of the reference identified high-voltage terminal H₁ and the line-to-neutral voltage of the corresponding identified low-voltage terminal X₁.

Unless specified otherwise and identified on the nameplate, the angular displacement between high-voltage and low-voltage phase voltages of three-phase transformers with Δ-Δ or Y-Y connections shall be zero degrees. The phasor group designation (vector group) shall be shown on the transformer's nameplate, near the phasor diagram.

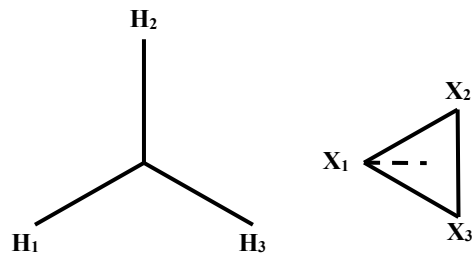
The angular displacement between high-voltage and low-voltage phase voltages of three-phase transformers with Y-Δ or Δ-Y connections shall be 30°, with the low voltage lagging the high voltage as shown in Figure 1.

Additional phasor diagrams are described in IEEE Std C57.12.70.

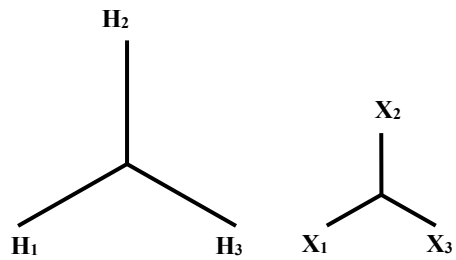
Motion #2



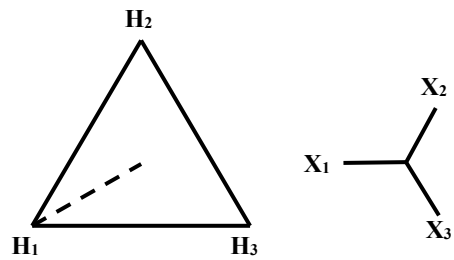
$\Delta - \Delta$ CONNECTION (Dd0)



Y - Δ CONNECTION (Yd1)



Y - Y CONNECTION



Δ - Y CONNECTION

Figure 1 —Phase relation of terminal designation for three-phase transformers

Motion #3

Table 6—Nameplate information

Row	Nameplate A	Nameplate B	Nameplate C
1	Serial number ^a	Serial number ^a	Serial number ^a
2	Month/year of manufacture	Month/year of manufacture	Month/year of manufacture
3	Class (ONAN, ONAF, etc.) ^b	Class (ONAN, ONAF, etc.) ^b	Class (ONAN, ONAF, etc.) ^b
4	Number of phases	Number of phases	Number of phases
5	Frequency	Frequency	Frequency
6	kVA rating ^{a, b}	kVA rating ^{a, b}	kVA (or MVA) rating ^{a, b}
7	Voltage ratings ^{a, c}	Voltage ratings ^{a, c}	Voltage ratings ^{a, c}
8	Tap voltages ^d	Tap voltages ^d	Tap voltages ^d
9	Temperature rise, °C	Temperature rise, °C	Temperature rise, °C
10	Polarity (single-phase transformers)	Polarity (single-phase transformers)	Polarity (single-phase transformers)
11	Phasor diagram and phasor group designation (polyphase transformers)	Phasor diagram and phasor group designation (polyphase transformers)	Phasor diagram and phasor group designation (polyphase transformers)
12	Percent impedance ^e	Percent impedance ^e	Percent impedance ^e
13	—	Basic lightning impulse insulation levels (BIL) ^f	Basic lightning impulse insulation levels (BIL) ^f
14	Approximate total mass in kg or weight in lb ^g	Approximate total mass in kg or weight in lb ^h	Approximate total mass in kg or weight in lb ^h
15	Connection diagram ⁱ	Connection diagram ⁱ	Connection diagram ⁱ
16	Name and location (country) of manufacturer	Name and location (country) of manufacture	Name and location (country) of manufacture
17	Installation and operating instructions reference	Installation and operating instructions reference	Installation and operating instructions reference
18	The word <i>transformer</i> or <i>autotransformer</i>	The word <i>transformer</i> or <i>autotransformer</i>	The word <i>transformer</i> or <i>autotransformer</i>
19	Type of insulating liquid (generic name preferred) ^j	Type of insulating liquid (generic name preferred) ^j	Type of insulating liquid (generic name preferred) ^j
20	Conductor material (of each winding)	Conductor material (of each winding)	Conductor material (of each winding)
21	Liquid volume	—	Step-up operation suitability ^k
22	—	—	Maximum value of primary voltage ^l
23	—	—	Tank, pressure, and liquid data ^m
24	Department of Energy (DOE) compliant ⁿ	DOE compliant ⁿ	DOE compliant ⁿ
25	---	---	Core Design – Core or Shell form
26	---	---	Core Type - Number of limbs (wound), Shell Type - D type , 7 limbs, or others

4. Changes to Low Frequency Tests from Ajith Varghese's RLFT TF in the Dielectric Test SC. The final survey approved by TF and SC in the Fall 2024 meeting is shown below. Text in black is existing, red is revised, blue is added.

a. Partial Discharge for Class I Transformers:

Table 4—Dielectric insulation levels for all windings of Class II power transformers, voltages in kV

Maximum system voltage (kV rms)	Nominal system voltage ^a (kV rms)	Applied-voltage test ^b (kV rms)			Induced-voltage test ^{b, c} (phase to ground) (kV rms)		Winding line-end BIL ^d (kV crest)				Neutral BIL ^{e, f} (kV crest)	
		Delta and fully insulated wye	Grounded wye	Impedance grounded wye or grounded wye with higher BIL	Enhanced 7200 cycle	One hour	Minimum	Alternates			Grounded wye	Impedance grounded wye or grounded wye with higher BIL
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12	Col 13
≤ 17	≤ 15	34	34	34	16	14	110				110	110
26	25	50	34	40	26	23	150				110	125
36	34.5	70	34	50	36	32	200				110	150
48	46	95	34	70	48	42	200	250			110	200
73	69	140	34	95	72	63	250	350			110	250
121	115	173	34	95	120	105	350	450	550		110	250
145	138	207	34	95	145	125	450	550	650		110	250
169	161	242	34	140	170	145	550	650	750	825	110	350
242	230	345	34	140	240	210	650	750	825	900	110	350
362	345	518	34	140	360	315	900	1050	1175		110	350
550	500	N/A	34	140	550 ^g	475 ^g	1425	1550	1675		110	350
765	735	N/A	34	140	880 ^g	750 ^g	1950 ^g	2050			110	350
800	765	N/A	34	140	885 ^g	795 ^g	1950 ^g	2050			110	350

^aFor nominal system voltage greater than maximum system voltage, use the next higher voltage class for applied-voltage test levels.

^bThe induced-voltage tests ~~shall be conducted at voltages in the table above~~ are based on an overvoltage factor of approximately $1.58 \times$ nominal system voltage for the one hour test and $1.80 \times$ nominal system voltage for the enhanced 7200 cycle test.

5.10.5.5 Induced-voltage test for Class II power transformers

With the transformer connected and excited as it will be in service, an induced-voltage test shall be performed as indicated in Figure 2, at voltage levels indicated in Columns 6 and 7 of Table 4. ~~Minimum line-to-ground induced test levels for Class II power transformers shall be a multiple of corresponding line-to-ground nominal system voltage as follows: 1.58 times for one-hour tests and 1.8 times for 7200 cycles enhancement level tests.~~

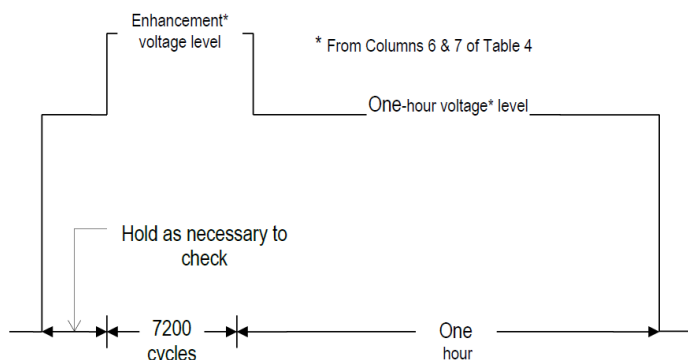


Figure 2—Induced-voltage test for Class II power transformers

b. Induced Overvoltage – Nominal versus Maximum operating voltage:

Table 3—Dielectric insulation levels for distribution and Class I power transformers, voltages in kV

Maximum system voltage (kV rms)	Nominal system voltage ^{a, c} (kV rms)	Applied-voltage test ^d (kV rms)			Induced-voltage test ^e (phase to ground) (kV rms)	Winding line-end BIL ^{h, i} (kV crest)			Neutral BIL ^{h, i, k} (kV crest)	
		Delta or fully insulated wye	Grounded wye	Impedance grounded wye or grounded wye with higher BIL		Minimum	Alternates		Grounded wye	Impedance grounded wye or grounded wye with higher BIL
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11
Part A - Distribution transformers										
1.5	1.2	10	-	10	1.4	30			30	30
3.5	2.5	15	-	15	2.9	45			45	45
6.9	5	19	-	19	5.8	60			60	60
11	8.7	26	-	26	10	75			75	75
17	15	34	-	34	17	95	110		75	75
26	25	40	-	40	29	125	150		75	95
36	34.5	50	-	50	40	125	150	200	75	125
48	46	95	-	70	53	200	250		95	150
73	69	140	-	95	80	250	350		95	200
Part B - Class I power transformers without partial discharge testing										
1.5	1.2	10	10	10	1.4	30	45		45	45
3.5	2.5	15	15	15	2.9	45	60		60	60
6.9	5	19	19	19	5.8	60	75		75	75
11	8.7	26	26	26	10	75	95		95	95
17	15	34	26	34	17	95	110		95	110
26	25	50	26	40	29	150			95	125
36	34.5	70	26	50	40	200			95	150
48	46	95	34	70	53	200	250		110	200
73	69	140	34	95	80	250	350		110	250
Part C - Class I power transformers with partial discharge testing specifically requested by purchaser										
1.5	1.2	10	10	10	1.2	1.1	30	45	45	45
3.5	2.5	15	15	15	2.6	2.3	45	60	60	60
6.9	5	19	19	19	5.2	4.6	60	75	75	75
11	8.7	26	26	26	9	7.9	75	95	95	95
17	15	34	34	34	16	14	95	110	95	110
26	25	50	34	40	26	23	150		95	125
36	34.5	70	34	50	36	32	200		95	150
48	46	95	34	70	48	42	200	250	110	200
73	69	140	34	95	72	63	250	350	110	250

^aFor nominal system voltage greater than maximum system voltage, use the next higher voltage class for applied-voltage test levels.

^bInduced-voltage tests shall be conducted at 2.0 x nominal system voltage for 7200 cycles.

^cBold typeface BILs are the most commonly used standard levels.

^dY-Y-connected transformers using a common solidly grounded neutral may use neutral BIL selected in accordance with the low-voltage winding rating.

^eSingle-phase distribution and power transformers and regulating transformers for voltage ratings between terminals of 8.7 kV and below are designed for both Y and Δ connection, and are insulated for the test voltages corresponding to the Y connection so that a single line of transformers serves for the Y and Δ applications. The test voltages for such transformers, when connected and operated, are therefore higher than needed for their voltage rating.

^fFor series windings in transformers, such as regulating transformers, the test values to ground shall be determined by the BIL of the series windings rather than by the rated voltage between terminals.

^gValues listed as nominal system voltage in some cases (particularly voltages 34.5 kV and below) are applicable to other lower voltages of approximately the same value. For example, 15 kV encompasses nominal system voltages of 14 440 V, 13 800 V, 13 200 V, 13 090 V, 12 600 V, 12 470 V, 12 000 V, and 11 950 V.

^hNeutral BIL shall never exceed winding BIL.

ⁱInduced voltage tests shall be conducted at 1.58 x nominal system voltage for one hour and 1.8 x nominal system voltage for enhanced 7200 cycle test.

Respectfully submitted,
Eric Davis, WG Chair
March 26, 2025

L.3.4 WG Standards Transformer on Continuous Revision for C57.12.90

Standards Working Group on the Continuous Revision of C57.12.90

Standards Subcommittee

IEEE/PES Transformers Committee

WG Chair: Stephen Antosz

Vice-Chair/Secretary: Jason Varnell

Spring 2025 Denver; March 26, 2025 (new text is highlighted)

INTRODUCTION

This is a working group by committee of task forces, for continuous revision of C57.12.90. The purpose of the WG is to keep track of the work being done in various TF/WG/SC's for inclusion in the continuous revision of C57.12.90 in a consistent manner. The WG exists administratively in the Standards Subcommittee and has no live meetings. The technical work is done in other subcommittees based on expertise and scope. WG membership consists of the people actively working on revisions. These people are the TF Chairs, SC Chairs, and other significant contributors to the current version. WG Members are:

Donald Ayers

Ramsis Girgis

Poorvi Patel

Sylvain Plante

Bertrand Poulin

Diego Robalino

Hakan Sahin

Dinesh Sankarakurup

Daniel Sauer

Sam Sharpless

Sanjib Som

Ajith Varghese

Currently there are six Task Forces in three different Subcommittees, as follows:

1. PCS – Cont Rev to Test Code C57.12.90 Clauses 5-9, & 12, TF Chair: Hakan Sahin
2. PCS – Audible Sound Revision Clause 13, TF Chair: Ramsis Girgis
3. Dielectric Test – Cont Rev to Impulse Tests in Clause 10, TF Chair: Sylvain Plante
4. Dielectric Test – Cont Rev to LowFrequency Tests Clause 10, TF Chair: Ajith Varghese
5. Dielectric Test –Core Ground and Winding Insulation Resistance, 10.11, TF Chair: Diego Robalino
6. Insulation Life – Cont Rev to Temperature Test Clause 11 and Resistance Clause 5, TF Chair: Dinesh Sankarakurup

SUMMARY

C57.12.90-2021 was approved as a revised standard by the IEEE-SA Standards Board on Nov 9, 2021. It was published on Feb 4, 2022. The WG Chair took out a new PAR on Feb 28, 2022, which was approved by the IEEE-SA Standards Board on May 13, 2022. The PAR expires on December 31, 2026.

The WG met at the beginning of the Standards SC meeting in Denver on March 26, 2025. A quorum was present. Ajith Varghese made the following motion, “I move that C57.12.90 go to Sponsor Ballot with the changes approved by the respective SCs.” Dan Sauer seconded the motion. The motion was unanimously approved. Dan Sauer made the following motion, “I move that the WG create a Ballot Resolution Group (BRG) to resolve comments received during the ballot.” Ajith Varghese seconded the motion. We did; and the BRG will be the same WG members. At the SC meeting, the SC unanimously approved the WG to begin the IEEE-SA ballot process for the C57.12.90 document. See the SC Minutes.

FUTURE REVISIONS AND PENDING WORK

Any new material provided by the various Task Forces to this WG for inclusion in the next revision, will first be approved by the responsible technical subcommittee (Diel Test, PCS, Dist, IL, etc.) and then presented to the Standards Subcommittee for the “official” vote of approval to go to ballot.

Changes ALREADY APPROVED for the next revision:

1. Hakan Sahin’s PCS TF for Revision of C57.12.90.
 - a. Changes to subclause 7.3, Ratio test methods to “modernize” it. Final survey approved in the Spring 2021 virtual meeting.

Insert a new subclause 7.3.1 as follows:

7.3.1 Electronic ratio and phase measurement meters

An electronic meter that determines the transformer turns ratio, polarity and phase angle may be used for the measurement of these parameters.

The existing 7.3.1 Voltmeter method should be renumbered to be 7.3.2, are no changes to the text.

The existing 7.3.2 Comparison method should be renumbered to be 7.3.3, no changes to the text or figures 10 & 11.

The existing 7.3.3 Ratio meter clause and figure 12 is to be deleted.

- b. Ratio test voltage and frequency under subclause 7.1.2. Request to change frequency bandwidth. TF and SC approved in Spring 2022.

7.0 Ratio test

Current Version:

7.1.2 Voltage and frequency

The ratio test shall be made at rated or lower voltage and rated or higher frequency.

Revised Version

7.1.2 Voltage and frequency

The ratio test shall be made at rated or lower voltage and be such that the ratio of test voltage to test frequency is less than or equal to the ratio of rated voltage to rated frequency.

- c. Number of short-circuit tests under subclause 12.3.4. TF and SC approved in Spring 2022.

Current Version:

12.3.4 Number of tests

Each phase of the transformer shall be subjected to a total of six tests satisfying the symmetrical current requirement specified in 12.3.1 or 12.3.2, as applicable. Two of these tests on each phase shall also satisfy the asymmetrical current requirements specified in 12.3.3.

Revised Version

12.3.4 Number of tests

- When a three-phase transformer is tested in a three-phase test circuit or in a single-phase test circuit as given in Annex C, each phase of the transformer shall be subjected to three tests satisfying the asymmetrical current requirements specified in 12.3.3. The tests shall be performed on one of the outer phases with the tap-changer in the maximum position, on the other outer phase with the tap-changer in the minimum position and on the middle phase with the tap-changer in the principal position
- When a single-phase transformer is tested in a single-phase test circuit the transformer shall be subjected to three tests satisfying the asymmetrical current requirements specified in 12.3.3. The three tests shall be performed one each, with the tap-changer in the maximum, minimum and principal position.

- d. Load Tap Changer performance test with rated voltage. New subclause 8.7. TF and SC approved in Spring 2022. It was re-discussed in Fall 2022 but no changes were made so still considered to be approved.

8.7 Load Tap Changer Voltage Test

8.7.1 General

In order to verify the performance of a transformer that has a load tap changer (LTC), the LTC shall be operated through one end-to-end-to-end sequence (from one tap extreme to the other tap extreme and back again) with the transformer energized at rated voltage.

8.7.2 Control voltage

Control voltage for the LTC motor during the test shall be as near to rated voltage as possible, with a minimum of 85%.

8.7.3 Preparation for the test

The LTC shall be fitted with all included equipment. It shall be connected as it will be in service, including protective devices.

8.7.4 Procedure

Either the high or low voltage winding of the transformer under test shall be energized at rated voltage and frequency, unless otherwise specified. The LTC shall be operated using the motor drive but not manual rotation. The LTC shall be operated through all tap positions twice, starting at one tap extreme and progressing to the other tap extreme, and then return back again to the original tap position. The test may be performed at intervals, if necessary, such as to adjust the test circuit for the applied voltage to be adjusted to the rated voltage of the tap position, but it is a requirement that the transformer be energized at no less than rated voltage corresponding to each tap to be changed.

8.7.5 Observations and Analysis

8.7.5.1 Audible Sound

The transformer shall be observed during this test and the operator shall identify that the sound during the tap changing operations was either normal or abnormal. With some types of tap changers, there will be abnormally loud sounds if components are not assembled properly. Note that during operation of the change-over selector (reversing switch or coarse-tap selector) the sound can be slightly different.

8.7.5.2 Supply Test Circuit

The test control system shall be monitored for any trip of the test circuit that automatically stops the circuit from keeping the transformer energized.

8.7.5.3 Dissolved Gas-in-Oil Analysis

Oil samples shall be taken from the LTC compartment of vacuum type tap-changers before and after the test and analyzed for dissolved gasses. Results of the analysis may show some increase of dissolved gases due to current commutation, resistor heating and / or stray-gassing of the oil.

8.7.6 Failure Detection and Acceptance Criteria

The transformer will have passed this LTC Voltage test if:

- The tap changer operates normally with no abnormal sound
- The transformer stays energized without a trip in the supply test circuit
- For mineral oil filled vacuum LTCs, the increase of the sum of H₂, CH₄, C₂H₆, C₂H₄ and C₂H₂ should not exceed 12 ppm for in-tank type LTCs and 6 ppm for compartment type LTCs.
- For non-vacuum type LTCs, or LTCs filled with a liquid other than mineral oil, the determination of acceptance criteria is through sound only and there is not a limit for increase in gases.

- e. Load Tap Changer performance test with rated current. New subclause 9.6. TF and SC approved in Spring 2022. It was re-discussed in Fall 2022 but no changes were made so still considered to be approved.

9.6 Load Tap Changer Current Test

9.6.1 General

In order to verify the performance of a transformer that has a load tap changer (LTC), the LTC shall be operated through one end-to-end-to-end sequence (from one tap extreme to the other tap extreme and back again) with the transformer current flowing through the windings, corresponding to the top nameplate MVA rating.

9.6.2 Control voltage

Control voltage for the LTC motor during the test shall be as near to rated voltage as possible, with a minimum of 85%.

9.6.3 Preparation for the test

The LTC shall be fitted with all included equipment. It shall be connected as it will be in service, including protective devices.

9.6.4 Procedure

The test shall be performed by applying a short circuit either the high-voltage winding or the low-voltage winding and applying sufficient voltage across the other winding to cause a specific current to flow in the windings. The LTC shall be operated using the motor drive but not manual rotation. The LTC shall be operated through all tap positions twice, starting at one tap extreme and progressing to the other tap extreme, and then return back again to the original tap position. The test may be performed at intervals, if necessary, such as to adjust the test circuit for the applied voltage to be adjusted to the required current of the tap position, but it is a requirement that the transformer be energized at no less than 80% of the top MVA nameplate current value for each tap change.

9.6.5 Observations and Analysis

9.6.5.1 Audible Sound

The transformer shall be observed during this test and the operator shall identify that the sound during the tap changing operations was either normal or abnormal. With some types of tap changers, there will be abnormally loud sounds if components are not assembled properly. Note that during operation of the change-over selector (reversing switch or coarse-tap selector) the sound can be slightly different.

9.6.5.2 Supply Test Circuit

The test control system shall be monitored for any trip of the test circuit that automatically stops the circuit from keeping the transformer energized.

9.6.5.3 Dissolved Gas-in-Oil Analysis

Oil samples shall be taken from the LTC compartment of vacuum type tap-changers before and after the test and analyzed for dissolved gasses. Results of the analysis may show some increase of dissolved gases due to current commutation, resistor heating and / or stray-gassing of the oil.

9.6.6 Failure Detection and Acceptance Criteria

The transformer will have passed this LTC Voltage test if:

- The tap changer operates normally with no abnormal sound

- The transformer stays energized without a trip in the supply test circuit
 - For mineral oil filled vacuum LTCs, the increase of the sum of H₂, CH₄, C₂H₆, C₂H₄ and C₂H₂ should not exceed 12 ppm for in-tank type LTCs and 6 ppm for compartment type LTCs.
 - For non-vacuum type LTCs, or LTCs filled with a liquid other than mineral oil, the determination of acceptance criteria is through sound only and there is not a limit for increase in gases.
2. Changes to Insulation Power Factor test, from Diego Robalino's Diel Test SC TF for Winding Insulation Power Factor. Final survey approved in the Fall 2021 virtual meeting and by DielTest SC Jan 2022. Specifically with regards to Subclause 10.10.2 revising the accuracy requirements of instrumentation.

The existing text is:

10.10.2 Instrumentation

The insulation power factor may be measured by special bridge circuits or by the voltampere-watt method. The accuracy of measurement should be within $\pm 0.25\%$ insulation power factor, and the measurement should be made at or near a frequency of 60 Hz.

The revised text to replace it will be:

10.10.2 Instrumentation

The insulation line-frequency power factor or dissipation factor may be measured by special bridge circuits or by the voltampere-watt method. The accuracy of the measurement instrumentation at or near rated frequency should be:

- for Insulation Power Factor Below 1%: $\pm 2\%$ of reading $\pm 0.05\%$ absolute
- for Insulation Power Factor Above 1%: $\pm 5\%$ of reading $\pm 0.05\%$ absolute

3. Changes to Clause 11 Temperature Test, from Dinesh Sankarakurup's TF in the Insulation Life SC.
- a. Changes to subclause 11.3.2, Liquid Temp Rise Determination. Final survey approved by TF and SC in the Spring 2023 meeting. In the first paragraph change the word "ultimate" to "stabilized", and add a sentence that the top oil rise shall not be averaged over time. Text in black is existing, red is revised, blue is deleted.
- Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ~~ultimate~~ **stabilized** temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1 °C, whichever is greater, during a consecutive 3 h period. **The stabilized liquid temperature rise determined at the end of the total loss run shall not be averaged over time.**
- b. **11.4.3 Add text that reverse correction for altitude is also allowed; i.e., when factory is located above 1000 m and transformer rating is based on <1000m.**

The final survey was done and approved by TF and SC in the Spring 2025 meeting

- c. Proposal by Bertrand Poulin to move OFAF Cooling and Top Duct Oil temperature diagram from C57.119 to C57.12.90. The final survey was done and approved by TF and SC in the Spring 2025 meeting
4. Changes to Audible Sound from Ramsis Girgis' TF in the Perf Char SC. The changes were approved by the TF at Spring 2023. The Perf Char SC approved in-person at the Kansas City meeting. Text in black is existing, red is revised, blue is deleted.
 - a. Changes to 13.3.3.1 No-load audible sound level.

When a transformer is equipped with a tap changer, the transformer may, on certain tap changer positions, produce sound levels that are higher than the audible sound level at the rated tap position. For these transformers, the measurements ~~shall may, upon purchaser request, and as agreed upon,~~ be made with the transformer on the highest sound producing tap position.

Also, other excitation conditions may occur in service leading to lower, or higher, **core noise**. For example, transformers designed to operate with variable flux the core audible sound level is strongly impacted by the tapping position. **The same is true for SVC transformers when connected to a capacitive load;** Again, for these transformers, the measurements ~~shall may, upon purchaser request, and as agreed upon,~~ be made with the transformer operating at the highest sound producing condition.
 - b. Changes to 13.5.5.1 Measuring ambient sound pressure level.

~~The ambient sound pressure level shall be established by averaging the ambient sound pressure levels measured immediately preceding and immediately following the sound measurements with the transformer energized. The ambient sound shall be measured at a minimum of four locations, and the instruments shall be in conformance with 13.2.~~ **The ambient sound pressure level shall be measured at a minimum of four locations around the transformer immediately preceding and immediately following the sound measurements with the transformer energized. The ambient sound pressure level shall be established by calculating the logarithmic average of measured values of the ambient sound pressure levels. The measuring instruments shall be in conformance with 13.2.** However, additional measurements may be made if agreed to by the manufacturer and purchaser or if the ambient measurements vary by more than 3 dB around the transformer. ...
 - c. Changes to 13.3.3.2 Load audible sound level.

Since load audible sound becomes a contributor to the total audible sound of the transformer at higher loads, the load audible sound level shall be measured at the ONAF measuring contour. **For transformers with only an ONAN rating, load noise is to be measured at the ONAN sound measuring contour.**
5. Changes to Low Frequency Tests from Ajith Varghese's RLFT TF in the Diel Test SC. Final survey approved by TF and SC in the Spring 2023 meeting. Text in black is existing, red is revised, blue is deleted.
 - a. Changes to Induced Test for Class II, Clause 10.8.2 PD Test Procedure

10.8.2 Test procedure

The voltage shall first be raised from zero to the 1.05 X line to ground value of the nominal system voltage (column 2, C57.12.00 Table 4) and held long enough to attain a stable partial discharge level and then record the level of partial discharge. The voltage shall then be raised to the one-hour level and held for a minimum of 5 min or until a stable partial discharge level is obtained to verify that there are no partial discharge problems. The partial discharge level shall be measured at the end of the 5 min period. If the 5 min. period at the 1 h voltage level is extended to obtain a stable partial discharge level the partial discharge shall be measured at the end of this period so that the level of partial discharges are recorded just before raising the voltage to the enhancement level. The voltage shall then be raised to the enhancement level and held for 7200 cycles. The voltage shall then be reduced directly to the one-hour level and held for 1 h.

During this 1 h period, partial discharge measurements shall be made at 5 min intervals. Partial discharge acceptance criteria shall be based on each line terminal rated 69 kV and above. These measurements shall be made in accordance with 10.9.

Immediately following the 1 h period, the voltage shall then be reduced to 1.05 X line to ground value of the nominal system voltage (column 2, C57.12.00 Table 4) and held until a stable partial discharge level is obtained and the partial discharge level measured.

b. Changes to Induced Test for Class II, Clause 10.8.5 PD Failure Detection.

10.8.5 Failure detection

Failure may be indicated by the presence of smoke and bubbles rising in the insulating liquid, an audible sound such as a thump, or a sudden increase in the test current. Any such indication shall be carefully investigated by observation, by repeating the test, and by other diagnostic tests to determine whether a failure has occurred. In terms of interpretation of partial discharge measurements, the results shall be considered acceptable and no further partial discharge tests required under the following conditions:

- a) The magnitude of the partial discharge level does not exceed 250 pC during the 1 h test period.
- b) The increase in partial discharge levels during the 1 h period does not exceed 50 pC.
- c) The partial discharge levels during the 1 h period do not exhibit any steadily rising trend, and no sudden sustained increase in the levels occurs during the last 20 min of the test.
- d) The magnitude of partial discharge level at 1.05 X Nominal System Voltage following the 1 h test period does not exceed 100 pC.

c. Addition of text regarding venting of bushings during PD test. In Vancouver S24, the Dielectric Tests SC approved the following text to be added to the end of Subclause 10.8.5.

If the partial discharge is measured during the Induced-voltage testing of the transformer and is suspected to be generated within an OIP (oil-impregnated-paper) bushing(s), it is permissible to “vent” the bushing(s) exhibiting partial discharge to the atmosphere using the bushing manufacturer’s instructions.

Unless agreed between manufacturer & purchaser, bushings shall not be vented proactively prior to dielectric testing. The Induced-voltage test shall be entirely repeated after venting the bushing and a note shall be added to the certified test report indicating bushing(s) were vented during the induced-voltage test.

Notes:

- 1) Partial discharge intended to be addressed by venting the bushing, is a low energy discharge arising from partial vacuum (pressure below atmosphere) created in the expansion chamber and/or gas bubbles generated during the Temperature Rise test and the cooling down afterwards. Partial vacuum is created in the expansion chamber due to absorption of nitrogen or air into oil,

and gas bubbles are formed due to saturation of nitrogen or air. Partial discharges from these cases may be resolved by venting the bushing. If continuous gas bubble generation or elevated partial discharge remains after the venting, additional investigations are required.

- 2) If there are concerns of gas generation from the temperature rise test causing bushing failure during impulse or applied voltage test, an induced-voltage test can be performed before impulse testing for diagnostic purposes. A complete induced-voltage test shall be performed as the last dielectric test, as specified in subclause 10.1.5.1 for dielectric test sequence.
 - 3) Not all OIP bushings exhibit these conditions, so bushing design can be a factor.
 - 4) The same condition of gas bubble formation or partial vacuum may occur in service during normal operation of load and overload cycles.
 - 5) Re-establishment of the bushing gas space blanket and resealing of the bushing must also be performed in accordance with the bushing manufacturer's instructions. The internal integrity of the bushing may be compromised by venting, by allowing in oxygen and moisture or by not reestablishing proper conditions.
- d. A revision to add clarification to the overvoltage factor for Induced Test in 10.8.1. In St Louis F24, the Dielectric Tests SC approved the following revisions to Subclause 10.8 Induced-voltage test for Class II power transformers. Text in black is existing, red is revised, blue is deleted.

10.8.1 General

Each Class II power transformer shall receive an induced-voltage test with the required test **voltage** levels **from IEEE Std C57.12.00-2021 Table 4 columns 6 and 7 based on the HV voltage class corresponding to the maximum system voltage. The required test voltage levels shall be** induced in the high-voltage winding. The tap connections shall be chosen, when possible, so that test levels developed in the other windings during the one-hour test are x times their **nominal system maximum operating** voltages, as specified in Table 4 of IEEE Std C57.12.00-2021, where x (also referred to as the “overvoltage factor” in the text that follows) is the ratio of the **line-to-line** test voltage on the high-voltage winding to the **nominal system maximum operating** voltage.

- e. Class I PD test. Revision to the test procedure by Don Ayer's sub Task Force. In St Louis F24, the Dielectric Tests SC approved revisions to Subclause 10.7 to insert a new category of test for Class I power transformers when PD measurements are specifically requested by the purchaser. What follows in red text is all new.

Induced-voltage tests for Class I power transformers with partial discharge measurements specifically requested by the purchaser

General

Each Class I power transformer shall receive an induced-voltage test with the required test levels induced in the high-voltage winding. The tap connections shall be chosen, when possible, so that test levels developed in the other windings during the one-hour test are x times their maximum operating voltages, as specified in Table 3, Part C of IEEE Std C57.12.00-2021, where x (also referred to as the “overvoltage factor” in the text that follows) is the ratio of the test voltage on the high-voltage winding to the maximum operating voltage.

For a transformer built with a single magnetic core holding all windings, all windings are excited at a unique induction level, often referred to as “volts-per-turn.” During an induced-voltage test, with the transformer connected and excited as in service, all windings are excited at the same overvoltage factor, regardless of what tap is selected. Each winding turn receives the same voltage.

The tap connections shall be chosen, when possible, such that voltages developed across other windings meet or exceed the required overvoltage factor.

The situation is quite different when transformers are equipped with auxiliary devices with separate magnetic cores, such as preventive autotransformer (reactor), series (booster) transformer, or series regulator. Different magnetic cores can be excited at different levels during operation or testing. In certain tap positions, these auxiliary devices do not have their core excited at all and no voltage appears across their windings. For such cases, the selection of the tap-changer position shall be guided by the principles described below. One exception is when such auxiliary devices are not excited on a permanent basis but used only as transitional devices. If equalizing windings are used, the highest voltage impressed across the preventive autotransformer will occur in either the bridging or non-bridging positions. This is because the preventive autotransformer is energized in all tap positions (bridging and non-bridging).

NOTE 1—Equalizing windings are described in IEEE Std C57.131 and IEC 60214-1.

For transformers equipped with a series (booster) transformer, preventive autotransformer (reactor), or any other device, the selected tap position of the load tap-changer (LTC) shall be the one that produces the highest voltage across the windings of the series transformer, preventive autotransformer, and other auxiliary devices as applicable. There can be a conflict of choosing such a tap position when more than one such device is present. In such a case, the selected tap position of the LTC should be the best compromise so that all devices are tested with overvoltage. One common example is the case where a series transformer and preventive autotransformer are both present. In this case, the tap selected shall be the one that is closest to the position that produces the highest voltage across the windings of the series transformer and simultaneously excites the preventive autotransformer, which is typically a bridging position (not applicable when the preventive autotransformer is energized only during transition).

In order to test the series (booster) transformer, preventive autotransformer, and other devices, at the required minimum overvoltage factor, the voltage developed on the terminals of other windings may exceed the one-hour level mentioned in Table 3, Part C of IEEE Std C57.12.00-2021. In such cases, an alternative tap position may be selected by agreement between the manufacturer and the purchaser to avoid overstressing components such as bushings. [Annex D](#) shows examples that can serve as a guide to select the LTC tap position for transformers having series (booster) transformer and/or preventive autotransformers.

For certain types of devices such as series reactors used as current limiting devices, there is no voltage developed across their windings during the induced voltage test as these devices are only excited when current flows in their windings. There is no option available to apply any overvoltage for these devices during the induced test.

NOTE 2—The selection of the tap-changer position for induced test should be agreed upon between manufacturer and purchaser prior to design to avoid conflicts during final acceptance tests.

Test procedure

The voltage shall first be raised to the one-hour level and held for a minimum of 1 min or until a stable partial discharge level is obtained to verify that there are no partial discharge problems. The level of partial discharges shall be recorded just before raising the voltage to the enhancement level. The voltage shall then be raised to the enhancement level and held for 7200 cycles. The voltage shall then be reduced directly to the one-hour level and held for 1 h.

During this 1 h period, partial discharge measurements shall be made at 5 min intervals. Partial discharge acceptance criteria shall be per subclause 10.7.2.5 and these measurements shall be made in accordance with [10.9](#).

The pressure inside the transformer tank during the induced test shall not be increased by artificial means for the purpose of reducing the PD level. The liquid level and pressure inside of the transformer tank and/or conservator tank shall be configured such that the oil head pressure during the induced test does not exceed the pressure under usual service conditions. Any exceptions that increase tank pressure by more than 3.5 kPa (0.5 psi) over normal operating pressure, such as the use of an elevated test facility conservator tank, requires customer approval prior to test. A note shall be added to the certified test report confirming this approval.

NOTE—Increasing the pressure for diagnostic purposes, such as to identify and possibly reduce suspected bubbles in the liquid, may be done as a remedial step to diagnose a source of high PD. To be considered valid, the test needs to be repeated with no added pressure as stated previously.

Connections

The transformer shall be excited exactly as it will be in service. The voltage may be induced from any winding or from special windings or taps provided for test purposes. Single-phase transformers shall be excited from single-phase sources. Three-phase transformers shall be excited from three-phase sources. The neutral terminals and other terminals that are normally grounded in service shall be solidly grounded. This will stress all of the insulation at the same per unit of overstress.

Frequency

The test frequency shall be increased, relative to operating frequency, as required to avoid core saturation. The requirements in 10.7.2 are also applicable in the case of this induced test

Failure detection

Failure may be indicated by the presence of smoke and bubbles rising in the insulating liquid, an audible sound such as a thump, or a sudden increase in the test current. Any such indication shall be carefully investigated by observation, by repeating the test, and by other diagnostic tests to determine whether a failure has occurred. In terms of interpretation of partial discharge measurements, the results shall be considered acceptable and no further partial discharge tests required under the following conditions.

- a) For transformers with nominal system voltage (NSV) of 34.5KV and above, the magnitude of the partial discharge level does not exceed 250 pC during the 1 h test period. For transformers below 34.5 kV NSV, the magnitude of the partial discharge level shall be set by agreement between the purchaser and the manufacturer.
- b) For transformers with nominal system voltage (NSV) of 34.5 kV and above the increase in partial discharge levels during the 1 h period does not exceed 50 pC. For transformers rated below 34.5 kV NSV, the increase of the partial discharge level shall be set by agreement between the purchaser and the manufacturer.
- c) The partial discharge levels during the 1 h period do not exhibit any steadily rising trend, and no sudden sustained increase in the levels occurs during the last 20 min of the test.

Judgment should be used on the 5 min readings so that momentary excursions of the partial discharge readings caused by cranes or other ambient sources are not recorded. Also, the test may be extended or repeated until acceptable results are obtained.

A failure to meet the partial discharge acceptance criterion shall not warrant immediate rejection, but it shall lead to consultation between purchaser and manufacturer about further investigations.

- f. Induced test. Editorial issue raised in Denver Spring 2025 that existing subclause 10.5.1 on Induced Tests on transformers with Series or Multiple connections should be moved back to 10.8.4 for Class II power transformers, where it was in 2006 edition. Since this issue also could apply to Class I power transformers, it will be duplicated in 10.7.2.4. The TF approved after only one discussion, in Denver on March 25. The Dielectric Tests SC also approved on March 26. The text is:

Induced-voltage test for transformers with series or multiple connections

Transformers with windings that have multiple connections (series-parallel or delta-wye) and whose connections each have a nominal system voltage of 25 kV or above shall receive two induced tests, one in each connection. If more than one winding has such multiple connections, then the connections in each of the windings shall change between the tests, and the manufacturer shall determine the relative connections for each test. The test voltage and duration (~~Class I—7200 cycle or Class II—one hour test~~) shall be contingent on the system voltage level of the high-voltage winding for the connection being tested. In all cases, the last induced test shall be for the connection with the highest test voltage.

6. Changes to Impulse Tests from Sylvain Plante's TF in the Diel Test SC. Final survey approved by TF and SC in the Spring 2023 meeting.

- a. Changes to 10.3.2.2, 10.3.2.3, 10.4.4, 10.4.5 impulse tests on transformers with series-multiple and delta-wye connections. The following final wording was approved by the Dielectric Test SC during the S23 Milwaukee SC meeting

10.3.2.2 Windings for series, parallel or multiple connections. The windings shall be tested for all series, parallel and multiple connections. The test voltage for these conditions shall correspond to the BIL of the winding for that connection.

10.3.2.3 Windings for delta or wye connections. The three-phase transformer shall be tested on both delta and wye connections. The test voltage for each connection shall correspond to the BIL of the winding for that connection.

10.4.4 Windings for series, parallel or multiple connections. For high-voltage windings with series, parallel or multiple connections above 15 kV, the routine impulse test shall be conducted on each connection at its assigned BIL. For nominal system voltages of 15 kV and below, only the series connections shall be tested, unless tests on all connections are specified.

10.4.5 Windings for delta or wye connections. For high-voltage windings of three-phase transformers with delta or wye connection above 15 kV, the routine impulse test shall be conducted on each connection at its assigned BIL. For nominal system voltages of 15 kV and below, only the wye connection shall be tested, unless tests on all connections are specified.

- b. Establishing guidelines about use of +/-3% tolerance on voltage peak for SI and LI. The following final wording was approved by the Dielectric Test SC during the F23 Kansas City SC meeting

Add as second paragraph to Subclause 10.2.2.2 The basic rule for application of the tolerance on voltage crest value is that testing laboratories shall aim for the test value specified. For any of the impulses of a test series, if the actual measured voltage is lower than the required voltage crest value but within the allowable tolerance of $\pm 3\%$, the impulse crest shall be accepted as valid. For any required subsequent impulse on the same terminal, adjustments shall be made to aim for the specified test value

Add as second paragraph to Subclause 10.3.1.1 The basic rule for application of the tolerance on voltage crest value is that testing laboratories shall aim for the test value specified. For any of the impulses of a test series, if the actual measured voltage is lower than the required voltage crest value but within the allowable tolerance of $\pm 3\%$, the impulse crest shall be accepted as valid. For any required subsequent impulse on the same terminal, adjustments shall be made to aim for the specified test value.

- c. Tap position for switching impulse. The S24 Vancouver Dielectric Tests SC approved a motion to add the following at the end of Subclause 10.2.4:

While selecting the tap connection complying to above requirements, the phase-to-phase voltage withstand capability of the transformer active part including LTC, bushings and all accessories shall be reviewed.

Testing on a non-compliant tap connection shall be discussed and agreed between manufacturer and purchaser.”

PENDING WORK

Since this is a continuous revision document, there is ongoing work in Task Forces.

1. Possible revisions from Hakan Sahin’s PCS TF for Revision of C57.12.90. In Denver Spring 2025 there was discussion related to Clause 5 and determining the temperature used for measuring cold resistance. This item is ongoing, but at this time there are no decisions made and nothing to change in 12.90. A small sub-TF will draft the wording.
2. Possible changes to Clause 13 sound test from Ramsis’ TF. Measuring sound level of Preventive Autotransformers (PA) in air as a Quality Control check was again presented and discussed. Possibly a Task Force Paper will be written. In Denver Spring 2025 there was continued discussion. This item is ongoing, but at this time there are no decisions made and nothing to change in 12.90.
3. Possible changes to Subclause 10.2 or 10.3 from Sylvain Plante’s TF regarding switching and lightning impulse tests. Ongoing discussion on the topic of requirement for sensitivity of current measurement of chopped waves. And possible future change to 10.3.4.2 to add requirements for voltage overlays, proposed by Jason Varnell.
4. Other possible revisions to subclauses 10.5 to 10.10 from Ajith Varghese’s TF for revision of low frequency tests. New discussion on the topic of PD calibration requirement moving from C57.113 Clause 5.1 to C57.12.90.
5. Possible changes to subclause 10.11 from Diego Robalino’s TF regarding insulation resistance. Possible future changes to insulation resistance measurement procedures are being considered, as compared to conflicting procedures in other documents such as C57.152. Also, possible future addition of core megger and clamp megger procedures since none currently exist in 12.90. The Task Force has gathered data on core ground measurements but has nothing to change in C57.12.90.
6. Changes to Clause 11 Temperature Test from Dinesh Sankarakurup’s TF
 - Clarification to Hottest spot Rise calculation using Fiber Optics. Egon and Ewald Schweiger of Siemens advanced their proposal to add as an alternate method an option to measure hot spot temperature using direct measurement

with fiber optic probes. A small sub task force developed wording. This was further discussed at TF meeting in Vancouver S24, and more work will be done. It was not discussed in St. Louis F24. Discussion in Denver Spring 2025 resulted in the request to circulate the proposed new text, and gather data.

- Request for clarification for temp test of 3-winding transformers, injecting maximum losses, and correcting for maximum common winding current in autos. Prior to Kansas City a small sub group developed some wording, it was briefly discussed in Kansas City. It was not discussed in St. Louis F24, nor in Denver Spring 2025..
- Standardize Method for Hot resistance extrapolation not covered in Kansas City, but Bertrand Poulin submitted some info that should be circulated to the TF. It was not discussed in St. Louis F24, nor in Denver Spring 2025..

Respectfully submitted,
Stephen Antosz, WG Chair
Jason Varnell, WG Vice-Chair
March 27, 2025

L.3.5 WG Standards Transformer on Revision for C57.152, Guide of Field Tests

*Standards Subcommittee,
WG – PC57.152 Revision
IEEE / PES Transformers Committee*

March 25, 2025, 4:45PM – 6:00PM

UNAPPROVED MINUTES

Welcome

The chair of the working group, Marcos Ferreira, and the secretary, Goran Milojevic, opened the meeting at 04:45PM.

1. Attendance and Attendance for Quorum

At the time of the meeting there were 30 Members, including Chair and Secretary. A total of 18 members were counted as present at the meeting. 72 members and guests signed into the circulating paper roster.

18 members present of 30 mean requirements for quorum were fulfilled. The list of attendees who signed into the paper roster is shown below:

Name	Affiliation	Status
Ferreira, Marcos	FEMA	Chair
Milojevic, Goran	DV Power	Secretary
Bradshaw, Jeremiah	US Bureau of Reclamation	Member
Dutta Roy, Samraghi	Siemens Energy	Member
Ermakov, Evgenii	Hitachi Energy	Member
Foata, Marc	Maschinenfabrik Reinhausen	Member
Gara, Lorne	Shermco	Member
Gustavsson, Niklas	Hitachi Energy	Member
Hayes, Roger	GE Vernova	Member
Hernandez, Ronald	Doble Engineering Company	Member
Locarno, Mario	Doble Engineering Company	Member
Mabrey, Stephanie	Weidmann Group	Member
Murray, David	TVA	Member
Poorvi, Patel	EPRI	Member
Robalino, Diego	Megger	Member
Saad, Mickel	Hitachi ABB Power Grids	Member
Sweetser, Charles	OMICRON Electronics Corp USA	Member
Tanaka, Troy	Burns & McDonnell	Member
Woods, Deanna	PTT	Member
Alonso, Mario	Georgia Transformer	Guest

Arnold, Elise	SGB	Guest
Balakrishnan, Mani	Delta Star	Guest
Chanda, Sudip	Delta Star	Guest
Chanmin, Jeong	HD Hyundai Service	Guest
Cordova, Olivia	US Bureau of Reclamation	Guest
Crockett, Dan	Ameren	Guest
Da Silva, Roberto	Maschinenfabrik Reinhausen	Guest
Debass, Sami	EPRI	Guest
Delgado, Gabriel	Invenergy	Guest
Duffy, Jesse	Nashville Electric Service	Guest
Elliott, Will	AEP SWECO	Guest
Espindola, Marco	Hitachi Energy	Guest
Faur, Florin	Prolec GE	Guest
Garner, Joshua	RESA Power	Guest
Gyore, Attila	MIDEL & MIVOLT Fluids	Guest
Jarosz, Patrycja	IEEE SA	Guest
Jones, Brexton	SD Myers	Guest
Kumar, Arvind	Delta Star	Guest
Labh, Ashwini	Hitachi Energy	Guest
LaBean	Consumers Energy	Guest
Lachance, Mathieu	Omicron Energy	Guest
Lakhani, Komel	Siemens Energy	Guest
Leal, Fernando	Prolec GE	Guest
Mani, Kumar	Duke Energy	Guest
Mellin, Tony	Vaisala	Guest
Merrill, Logan	Omicron Energy	Guest
Naderian, Ali	Consultant	Guest
Neild, Kris	Megger	Guest
Newbill, Mark	Hitachi Energy	Guest
Ortiz, Cuahtemoc	Niagara Power Transformer Company	Guest
Qiao, Crystal	Trench Group	Guest
Rapelly, Layman	Georgia Transformer	Guest
Robles, Antonio	US Bureau of Reclamation	Guest
Rodriguez, Jesus Sanchez	Vetriv	Guest
Santos, Armindo	Prolec GE	Guest
Sar Kinen, Garret	Xcel Energy	Guest
Scardazzi, Akior	Siemens Energy	Guest
Shaikh, Salahuddin	NRG Energy	Guest
Sinclair, John	Black & Veatch	Guest
Singh, Amitkumar	Con Edison	Guest
Steele, H. Allen	TVA	Guest
Szczachowski, Janusz	Maschinenfabrik Reinhausen	Guest
Sze, Matthew	Omicron Energy	Guest
Tan, Jonathan	Northern Transformer	Guest
Thiede, Andreas	HIGHVOLT Prueftechnik Dresden	Guest
Tolcachir, Eduardo	TTE	Guest

Varghese, Ajith	Prolec GE	Guest
Whitten, Christopher	Hitachi Energy	Guest
Wright, Jeffrey	Duquesne Light	Guest

2. Approval of the Agenda

The motion to approve the agenda was made by Evgenii Ermakov, and seconded by Diego Robalino. The motion was approved unanimously.

3. Approval of Minutes of Fall 2024 Meeting

The motion to approve the Minutes of Spring 2024 Meeting was made by Stephanie Mabrey, and seconded by Poorvi Patel. The motion was approved unanimously.

4. Call for Patents

The chair presented slide 1-4, dated January 2, 2018 informing of the IEEE patent policy and participants duty to inform. There were no issues related to patent assurance brought up by attendees in the meeting.

5. IEEE Copyright Policy

The chair presented IEEE-SA Copyright Policy slides 1-2 informing the audience of the policy.

6. Chair's Remarks

The chair, Marcos Ferreira, gave the following remarks.

“Updates since the last meeting, fall 2024, the CRG gathered several times through Teams meetings to address all comments provided by MEC successfully. Goran and I would like to express our sincere appreciation for the dedication and contribution from CRG team. Furthermore, Goran and I will present all technical and general comments to all of you, members of this WG, at this time so we can a vote to accept the responses proposed by CRG team.”

7. Report by the WG Secretary on the Comment Resolution Group's (CRG) activities

The secretary, Goran Milojevic, informed the working group about the activities since the Fall 2024 meeting:

- Initial balloting closed on November 5th, 2024, after an extension, once 76% response rate was reached.
- 91% approval rate on the draft
- 145 comments received in regular balloting process
- 32 comments on revised Section 7.2
- 2 comments on revised Section 7.3
- 16 comments on revised Section 7.4
- 34 comments on new annexes J and K

- 61 comments on the rest of the document
- 49 comments were editorial
- 51 comments were technical
- 45 comments were general
- Additional comments received after the close of balloting
- Comment Resolution Group (CRG) was formed at the Fall 2024 meeting with the following membership: Evgenii Ermakov, Niklas Gustavsson, Attila Gyore, Marcos Ferreira, Marc Foata, Ronald Hernandez, Mario Locarno, Goran Milojevic, Diego Robalino, Charles Sweetser.
- Five online meetings of the CRG were held.
- All 145 comments received during the official balloting process were addressed. The CRG members reached out to some commenters for clarification and consulted with other working groups within the Transformer Committee.
- During the meetings, CRG decided to accept 45 editorial comments and to revise 4.
- Out of remaining 96 technical and general comments CRG proposes accepting 63, revising 15, and rejecting 18.
- The full list of comments, with resolutions proposed by the CRG, was sent for review by email on March 14th

After the report, Stephanie Mabrey asked for clarification when the additional comments were received. The secretary, Goran Milojevic responded that they were received after the close of balloting.

8. Discussion of responses to technical and general comments proposed by the CRG

The secretary, Goran Milojevic, asked for present members and guests to bring up for discussion any specific comment responses proposed by the comment resolution group. Poorvi Patel asked to provide examples of major technical changes that were made to the document during the comment response process. The secretary, Goran Milojevic, explained the changes made in Table 1, and also

additional references to document C57.166 which caused removal of certain parts of the PC57.152 document.

9. Vote on accepting the response proposed by the CRG

After reviewing the proposed comment responses, Mario Locarno made a motion to vote on the full list of 145 comment responses that was submitted to the members for review prior to the meeting. The motion was seconded by Mickel Saad. The motion was accepted unanimously.

Another motion, to authorize the Comment Resolution Group to respond to any general and technical comments received during ballot recirculation, was made by Charles Sweetser and seconded by Mario Locarno. The motion was accepted unanimously.

10. Meeting Adjournment

The motion to adjourn the meeting was made by Evgenii Ermakov, and seconded by Mario Locarno. The meeting was adjourned at 05:30PM.

Respectfully submitted,

Marcos Ferreira – Chair

Goran Milojevic – Secretary

Minutes – Third Meeting: WG PC57.133

“Guide for Evaluating Transformer Performance under Reverse Power Flow”

3:15 PM to 4:30 PM MDT | March 25, 2025

Centennial DE, Floor 3 | Hyatt Regency Denver at Colorado Convention Center
Denver, CO

Chair:	Ryan Hogg	Bureau of Reclamation	rhogg@ieee.org
Vice Chair:	Bruce Webb	Knoxville Utilities Board	bruce.webb@kub.org
Secretary:	Drew Welton	Intellirent	dwelton@intellirentco.com

Minutes – items in green = discussion during meeting

1. [Behavior](#), [Copyright](#), and [Patent](#) – reviewed all slides
2. Quick review – PAR (expires 12/31/2028) – reviewed
3. Attendance form and quorum check (91 members; 46 required for quorum)
 - a. Attendance form displayed for attendees to sign in
 - b. 61 members were present of 91 total members, quorum was achieved
 - c. 24 guests requested membership, only 5 met the requirements for membership
 - d. Plans to record the meeting were announced, no objections
4. Agenda approval
 - a. Previously sent out, unanimous approval of the agenda, no objections
5. Minutes approval
 - a. October 29, 2024 meeting (St Louis)
 - b. February 24, 2025 meeting (virtual)
 - c. Previously sent out, unanimous approval of both sets of minutes, no objections
6. iMeet Central site:
 - a. <https://ieee-sa.imeetcentral.com/ieeedashboard/>
 - b. Quick demo, how to access IEEE Transaction Paper
 - c. Announcement of permission granted to the working group to use the Sept 1983 IEEE transaction paper, “Power Flow Direction Definitions for Metering of Bidirectional Power”. Document has a quadrants metering diagram.

- d. Plan to both upload it to Transformer Committee website and iMeet Central for working group to have as a reference.
- 7. Status update – TF Definition of Transformer Reverse Power
 - a. Chair of TF = Ryan Hogg
 - b. Have held 2 virtual meetings, more planned
 - c. Report on status of definition work
 - d. Developing a quadrants figure that standard could use
 - e. Task force chair provided an update of the work on a definition of reverse power.
 - f. TF has 29 member and conducted two virtual meetings since St. Louis (Fall 2024). Hopefully one more meeting to close the task force and present the working group with a finalized definition. TF also developed a quadrants image that guide could use.
 - g. Ramsis Girgis remarked about the feasibility of reverse power flow in step down vs. step up transformers, and the relationship of lagging power factor. A review of the different quadrants was presented for discussion.
- 8. Presentations: The following five presentations were delivered
 - a. Ramsis Girgis (Hitachi Energy) – Feasibility of Reverse Power Flow Scenarios in Step-Down Power Transformers
 - i. Question: For this modeling, was the high voltage system assumed to not move up/down in voltage, low side voltage moves as a result of reverse power flow?
 - 1. Answer: Yes, you can have up to 6% of the change in that case.
 - b. Ryan Hogg (Bureau of Reclamation) – Dry Type GSU and Station Service Power
 - c. Vinay Patel (Con Edison of New York) – Distributed generation
 - i. Amitabh Sarkar – We need to talk about how this affects the transformers, what were they designed for. What is the reverse power flow?
 - ii. Chair – Agreed, this is what these presentations/discussions are designed to bring up.
 - d. Dan Blaydon (Baltimore Gas & Electric) – Solar DER
 - e. Drew Welton (Intellirent) – Auto-determination OLTC controls
- 9. Review document outline – Chair presented “Draft PC57.133 Outline” (included further on in these minutes)
 - a. Thomas Dautat – proposed sections (*per email on February 27, 2025*)

- i. Reverse Power Flow – Power
 - ii. Reverse Power Flow – Transmission/Substation
 - iii. Reverse Power Flow – Distribution/Feeders
 - iv. Thomas Dauzat made a motion to split up the document into three sections: (1) Power, (2) Transmission/Substation, and (3) Distribution/Feeders
 - v. Motion was seconded by Ramsis Girgis
 - vi. A discussion of the motion was held during which many people asked for clarification of the motion's intent, the chair repeated the motion
 - vii. The motion was moved to be tabled; the motion to table the previous motion was seconded and received unanimous approval
- 10. Request task force chairs and volunteers to draft various proposed guide sections – did not have time to discuss, plan to discuss during a virtual working group meeting
- 11. Call for volunteers to present at future in-person meetings: – reviewed, no new volunteers spoke up during meeting
 - a. E.g., how have you/your organization been approaching reverse power and transformers, what impacts are you/your organization seeing...
 - b. In the works
 - i. Fall 2025 – Joe White
- 12. Old Business – none – reviewed
- 13. New Business – any? – no time to begin any new business
- 14. Next meetings
 - a. Possible virtual – if did not establish initial TFs to begin drafting text, host a virtual meeting to finalize outline and assign TFs – per discussion/status in meeting, planning to have a virtual working group meeting to establish task forces to begin drafting text for the guide
 - b. In person: Fall 2025 in Bonita Spring, FL
- 15. Adjourn – meeting adjourned as completed the agenda items

Draft PC57.133 Outline – as presented with item 9.

Introduction – “how we got here” as an industry

1. Overview

- 1.1. Scope
- 1.2. Purpose
- 1.3. Word Usage

2. Normative References

3. Definitions, acronyms, and abbreviations

- 3.1. Definitions
- 3.2. Acronyms and abbreviations

4. Historical context (*this might become an informative annex*)

- 4.1. Watts and VARs chart
- 4.2. Typical causes of reverse power flow (*note similarity to proposed Annex B*)

5. C57 Standards and Power Flow Direction

- 5.1. Step-down, step-up, bi-directional, same voltage both sides
- 5.2. C57.12.00, C57.12.01... other standards and how they discuss power flow direction

6. Potential effects

- 6.1. Voltage regulation (including OLTC and controls)
- 6.2. Core saturation (LV taps, variable flux)
- 6.3. Winding heating (common windings of autos)
- 6.4. Voltage imbalance (battery back feeding, delta connections and grounding)
- 6.5. Volts per turn increase (low voltage winding on step-down transformer, but providing VARs back to system)
- 6.6. Asymmetrical pennant cycle tap changer (does not work in reverse)
- 6.7. Inverters – Step down not designed to be inverter transformers, now operating as step-up (e.g., two grounds = harmonics; core design (shielding/grounding))
- 6.8. ...

7. Transformer designs and potential effects

- 7.1. Simple two winding
- 7.2. Two winding w/ LV taps
- 7.3. Two winding w/ LV taps, variable flux
- 7.4. Auto transformers
- 7.5. Multi winding transformers
- 7.6. Amorphous vs grain-oriented cores

8. Recommended actions for operation of existing transformers

9. Recommended guidance for new transformers (e.g., specification type language)

Annexes

Annex A: (informative) How to determine numerical values for Watt/VAR values for a specification

Annex B: (informative) How to assess which transformers are/may be subject to reverse power flow (system condition, therefore informative annex)

Working Group Force Membership/Guests:

	First Name	Last Name	Affiliation	Membership	Attended Feb 24, 2025 Meeting?
1	Kayland	Adams	Prolec-GE Waukesha	Member	No
2	Gilles	Bargone	FISO	Member	Yes
3	Mats	Bernesjo	Hitachi Energy	Member	Yes
4	Daniel	Blaydon	Baltimore Gas and Electric	Member	Yes
5	William	Boettger	Boettger Transformer Consulting LLC	Member	Yes
6	Garrett	Bradshaw	Howard Industries	Member	Yes
7	Jeffrey	Brooks	Asplundh Engineering Services	Member	Yes
8	Alfredo	Carrizales	Prolec GE	Member	Yes
9	Thomas	Dauzat	AEP-SWEPCO	Member	Yes
10	Nikolaus	Dillon	Dominion Energy	Member	Yes
11	Fernando	Duarte	Hitachi Energy	Member	Yes
12	Roger	Dugan	(Retired) Self	Member	No
13	Eric	Elson	San Diego Gas & Electric	Member	Yes
14	Miguel	Garcia	Hitachi Energy	Member	No
15	Eduardo	Garcia	Siemens Energy	Member	Yes
16	David	Garcia-Paredes	Virginia Transformers Corp	Member	No
17	James	Gardner	Prolec-GE Waukesha	Member	Yes
18	Ramsis	Girgis	Hitachi Energy	Member	Yes
19	Jose Antonio	Gonzalez Ceballos	Virginia/Georgia Transformers	Member	No
20	William	Griesacker	WGA	Member	Yes
21	Jesse	Hall	Virginia Transformer Corp.	Member	No
22	Corey	Hanson	Flex-Core	Member	Yes
23	Giovanni	Hernandez Decanini	Virginia Transformers Corp	Member	Yes
24	Samma	Hoffman	PPL	Member	No
25	Ryan	Hogg	Bureau of Reclamation	Member	Yes
26	Derek	Hollrah	Burns & McDonnell	Member	Yes
27	Saif	Hossain	Trench Group	Member	Yes
28	Miljenko	Hrkac	Hitachi Energy	Member	No
29	Jose	Izquierdo	Siemens energy	Member	Yes
30	Nick	Jensen	Delta Star	Member	Yes
31	John	John	Virginia Transformer Corp	Member	Yes
32	Christopher	Johnson	Oncor	Member	No
33	Akash	Joshi	Kimley-Horn	Member	No
34	Thrinadha	Katapalli	Virginia Transformer Corp	Member	No
35	Anton	Koshel	Delta Star Inc	Member	Yes
36	Mark	Lachman	Doble	Member	Yes

	First Name	Last Name	Affiliation	Membership	Attended Feb 24, 2025 Meeting?
37	Jihun	Lee	HD HYUNDAI ELECTRIC	Member	No
38	Junho	Lee	HD Hyundai Electric	Member	No
39	Kushal	Mahajan	Sungrow	Member	Yes
40	Swapnil	Marathe	Megger	Member	Yes
41	Daniel	Martinez	Jfe guest	Member	No
42	Katherine	Marulanda	Magnetron	Member	No
43	Brian	McCarrick	Virginia Transformer Corp	Member	Yes
44	Omar	Mendez	Prolec	Member	Yes
45	Emilio	Morales-Cruz	Qualitrol	Member	Yes
46	Tyler	Morgan	Duke Energy	Member	Yes
47	Dan	Mulkey	Mulkey Engineering Inc	Member	No
48	Ali	Naderian	EnerPars	Member	Yes
49	Shankar	Nambi	Bechtel Energy, Inc.	Member	Yes
50	Eduardo	Orozco	GE Grid Solutions	Member	No
51	Sanjay	Patel	Royal Smit Transformers	Member	Yes
52	Vinay	Patel	Con Edison	Member	Yes
53	Gustavo	Prado	Siemens Energy	Member	No
54	Tim	Raymond	Inductive Reasoning	Member	Yes
55	Yuri	Rossini	Siemens Energy	Member	Yes
56	Marnie	Roussell	Entergy	Member	Yes
57	Paul	Salvato	Intellirent	Member	No
58	Amitabh	Sarkar	Virginia Transformer Corporation	Member	Yes
59	Markus	Schiessl	SGB	Member	Yes
60	Eric	Schleismann	Southern Company	Member	Yes
61	Hemchandra	Shertukde	University of Hartford	Member	Yes
62	Leena	Shimpi	Mgm transformer	Member	No
63	Stephen	Shull	BBC Electrical Services Inv	Member	Yes
64	Igor	Simonov	Toronto Hydro	Member	No
65	James	Spaulding	City of Fort Collins Utilities	Member	No
66	Andy	Speegle	Entergy	Member	No
67	Brad	Staley	Leeward Renewable Energy	Member	No
68	Sunny	Swarna	Virginia Transformer Corp	Member	Yes
69	Marc	Taylor	JFE Shoji Canada	Member	Yes
70	Joseph	Tedesco	Hitachi Energy	Member	Yes
71	Ed	teNyenhuis	Hitachi Energy	Member	Yes
72	Mark	Tostrud	Dynamic Ratings	Member	Yes
73	Kannan	Veeran	Virginia/Georgia Transformer Corp	Member	No
74	Juan	Velasquez	Magnetron SAS	Member	No
75	Karsten	Viereck	Reinhausen Germany	Member	Yes

	First Name	Last Name	Affiliation	Membership	Attended Feb 24, 2025 Meeting?
76	Krishnamurthy	Vijayan	Pennsylvania transformers	Member	No
77	Dharam	Vir	Prolec GE	Member	Yes
78	Pragnesh	Vyas	Cleveland cliffs	Member	Yes
79	David	Walker	MGM Transformers	Member	Yes
80	Joe	Watson	JD Watson and Associates	Member	Yes
81	Bruce	Webb	Knoxville Utilities Board	Member	Yes
82	Drew	Welton	Intellirent	Member	Yes
83	Joe	White	POWER Engineers	Member	Yes
84	Jeffrey	Wright	Duquesne Light	Member	Yes
85	Fei	Yang	Hitachi Energy	Member	Yes
86	Tim	Young	Hitachi Energy	Member	No
87	Guang	Yuan	Hitachi Energy	Member	Yes
88	Michael	Zarnowski	Carte International	Member	No
89	Hongzhi (Alan)	Zhang	Hitachi Energy	Member	No
90	Shibao	Zhang	PCORE Electric	Member	Yes
91	Waldemar	Ziomek	PTI Transformers LP	Member	Yes
92	Stefan	Abelen	Maschinenfabrik Reinhausen Germany	Guest	No
93	Mihirkumar	Amin	Eaton Corporation	Guest	Yes, Requested Membership - not granted
94	Kyungchan	An	HYOSUNG	Guest	Yes
95	Alex	Ayala	ERMCO power partners	Guest	Yes
96	Duvier	Bedoya	Hitachi	Guest	Yes
97	Edwin	Betancourt	Siemens Energy	Guest	No
98	Enrique	Betancourt	Prolec GE	Guest	Yes
99	Naveen	Bhardwaj	Trench Group	Guest	No
100	Kevin	Biggie	Weidmann	Guest	Yes
101	Jeremiah	Bradshaw	Bureau of Reclamation	Guest	No
102	Josipa	Brekalo	Koncar D&ST	Guest	Yes
103	Christopher	Brown	San Diego Gas and Electric	Guest	Yes
104	David	Calitz	Siemens Energy	Guest	Yes
105	Fidel	Castro	Sdge	Guest	Yes
106	Bhaumik	Choksi	Hitachi Energy	Guest	No
107	Rhett	Chrysler	ERMCO	Guest	No
108	Adriana	Cisco Sullberg	Salt River Project	Guest	Yes
109	Brian	Conneighton	Cleveland Cliffs	Guest	Yes

	First Name	Last Name	Affiliation	Membership	Attended Feb 24, 2025 Meeting?
110	Janet	Crockett	Fayetteville PWC	Guest	Yes, Requested Membership - not granted
111	Rich	Cryer	Digitaldrid inc	Guest	Yes
112	Marcos	Czernorucki	Hitachi Energy	Guest	Yes
113	Luiz	de Oliveira	Hitachi Energy	Guest	Yes, Requested Membership - granted after Denver meeting
114	Sami	Debass	EPRI	Guest	Yes, Requested Membership - not granted
115	Scott	Digby	Duke Energy	Guest	Yes
116	Paul	Dolloff	EKPC and University of Kentucky	Guest	No
117	Samraghi	Dutta Roy	Siemens Energy Inc	Guest	Yes, Requested Membership - not granted
118	Janko	Dzodan	Koncar D&ST	Guest	No
119	Egui	Espitia	Reinhausen Manufacturing Inc	Guest	Yes
120	Sanford	Fong	Georgia Power	Guest	Yes
121	Patrick	Foster	NextEra Energy	Guest	Yes, Requested Membership - not granted
122	Raymond	Frazier	Ameren	Guest	No
123	Alan	Fujimori	Romagnole	Guest	Yes
124	Jose	Gamboa	The H-J Family of Companies	Guest	Yes
125	Dragana	Gasic	Koncar D&ST	Guest	No
126	Orlando	Giraldo	The H-J Family of Companies	Guest	Yes, Requested Membership - not granted
127	Alireza	Gorzin	Black & Veatch	Guest	No
128	Shawn	Gossett	Ameren	Guest	Yes
129	Christine	Grunbaum	Ameren	Guest	No
130	Didier	Hamoir	Transformer Protector Corporation	Guest	Yes
131	Kevin	Hampton	Siemens Energy	Guest	No

	First Name	Last Name	Affiliation	Membership	Attended Feb 24, 2025 Meeting?
132	Kyle	Heiden	Eaton	Guest	Yes, Requested Membership - not granted
133	Peter	Heinzig	Weidmann	Guest	Yes
134	Jean Carlos (JC)	Hernandez-Mejia	Georgia Tech NEETRAC	Guest	Yes
135	Balaji	Janakiraman	Virginia Transformer	Guest	Yes
136	Kurt	Kaineder	TRENCH	Guest	Yes, Requested Membership - not granted
137	Gary	King	Consultant/self	Guest	Yes
138	Kenneth	Klein	Johnson	Guest	Yes
139	Dmitriy	Klempner	Southern California Edison	Guest	Yes
140	Nicholas	Koinis	CenterPoint energy	Guest	Yes
141	Matija	Koprivnjak	Končar D&ST	Guest	Yes
142	Nihat	Kosedagi	Hitachi Energy	Guest	No
143	Krzysztof	Kulasek	Delta Star Inc.	Guest	Yes
144	Angela	Leigl	Eaton	Guest	No
145	Xose	Lopez-Fernandez	Universidade de Vigo	Guest	Yes, Requested Membership - granted after Denver meeting
146	Tim-Felix	Mai	Siemens Energy	Guest	Yes, Requested Membership - not granted
147	Kumar	Mani	Duke Energy	Guest	Yes
148	Filip	Mikulecky	Koncar Power Transformers Ltd.	Guest	Yes
149	Curtis	Moore	DIGITALGRID, INC.	Guest	Yes
150	Charles	Morgan	Eversource Energy	Guest	No
151	Fredy	Murcia	Siemens Energy	Guest	Yes, Requested Membership - granted after Denver meeting

	First Name	Last Name	Affiliation	Membership	Attended Feb 24, 2025 Meeting?
152	Hugo	Murillo	HJ	Guest	Yes, Requested Membership - granted after Denver meeting
153	Aniruddha	Narawane	Eaton	Guest	Yes, Requested Membership - not granted
154	Ashwin	Padmanaban Iyer	STP	Guest	Yes
155	Dipeshkumar	Patel	Hyper solutions	Guest	Yes, Requested Membership - not granted
156	Nitesh	Patel	Hyundai Power Transformers	Guest	Yes, Requested Membership - not granted
157	Monil	Patel	PG&E	Guest	Yes
158	Marcelino	Perez	Prolec	Guest	Yes, Requested Membership - not granted
159	Jouni	Peppanen	EPRI	Guest	No
160	Luka	Peuc	Končar D&ST	Guest	Yes
161	Thien	Pham	Siemens Energy	Guest	Yes, Requested Membership - not granted
162	Chris	Powell	Intermountain Electronics	Guest	Yes, Requested Membership - not granted
163	João	Pranke	Federal University of Santa Maria	Guest	No
164	Adnan	Rashid	Measurement Canada	Guest	No
165	Robert	Reepe	Georgia Power Co	Guest	Yes
166	Wei	Ren	EPRI	Guest	No
167	Juan	Rodriguez	Magnetron	Guest	Yes
168	Rodrigo	Ronchi	WEG Transformers México	Guest	Yes
169	Daniel	Sauer	Eaton	Guest	No

	First Name	Last Name	Affiliation	Membership	Attended Feb 24, 2025 Meeting?
170	Kabir	Sethi	Hitachi Energy Germany Ag	Guest	Yes, Requested Membership - not granted
171	Salahuddin	Shaikh	NRG Energy Inc	Guest	Yes, Requested Membership - not granted
172	Masoud	Sharifi	Siemens Gamesa Renewable Energy	Guest	No
173	Jason	Snyder	First Energy Corp	Guest	Yes
174	Markus	Stank	MR	Guest	Yes, Requested Membership - not granted
175	Andy	Steineman	Delta Star, Inc.	Guest	Yes
176	Janusz	Szczechowski	Reinhausen	Guest	Yes, Requested Membership - not granted
177	Michael	Thompson	SEL Engineering Services	Guest	No
178	Timothy	Tillery	Howard Industries	Guest	Yes
179	Eduardo	Tolcachir	TTE Transformers	Guest	No
180	Leonard	Torchia	PSE&G	Guest	Yes
181	Reinaldo	Valentin	Duke Energy	Guest	No
182	Valentina	Valori	Hitachi Energy	Guest	Yes
183	Matt	Weisensee	PacifiCorp	Guest	Yes
184	Stephen	Wolbach	Alabama Power	Guest	Yes
185	Terry	Wong	Trench Limited	Guest	Yes, Requested Membership - granted after Denver meeting
186	Jiahao	Xie	S&C electric	Guest	Yes
187	Koray	Yavuz	Noark Electric US	Guest	No
188	Patrycja	Jarosz	IEEE SA	IEEE SA	No

Note: Membership was only granted to those requesting who had attended two of the last three meetings.

S25 Unapproved Meeting Minutes

Standards Subcommittee Task Force

IEEE / IEC Cross Reference

Monday, March 24, 2024, 1:45pm to 3:00pm

Chair: Alan Washburn

1. Welcome
 - a. Meeting came to order at 1:50pm
2. Introduction of participants
 - a. 31 attendees:
 - b. Jaroslaw Chorzepa, Juan Carlos Cruz Valdes, Ronny Doerr, Samraghi Dutta Roy , Egui Espitia, James Gardner, Kyle Heiden, Saramm Hoffman, Traci Hopkins, Anton Koshel, Komelabbas Lakhani, José Luis Machain, Emilio Morales-Cruz, Augusto Morando, Hossein Nabi-Bidhendi, Shankar Nambi, Nirav Patel, Miguel Plascencia, Thomas Prevost, Robert Reepe, Marnie Roussell, Cody Schott, Ahmad Skeik, H. Allen Steele, David Stockton, Fernando Tirado, Aparna Vedantham, Pragnesh Vyas, Alan Washburn, Stephen Wolbach, James Thompson
3. IEEE SA patent policy and call for patents
4. IEEE SA copyright policy
5. Membership review
 - a. 5 of 10 members, quorum achieved
6. Review/approval of agenda
7. Review/approval of S24, F24 meeting minutes
8. Old business
 - a. Scope of TF
 - i. Continued discussion on index scope, format
 - b. Report on virtual meetings held
9. New business
 - a. Moving from Collabratec to OneDrive
 - b. Sample results
 - i. Split into two indexes, documents and topics
 - c. Discuss method to collect data
 - i. Will be sending a survey to gather ideas for prioritized topic list
10. Adjourn

Standards SC S24 Attendance List

Role	First Name	Last Name	2025 MAR
Secretary	Ajith	Varghese	X
Member	Alan	Washburn	X
Guest	Alan	Fujimori	X
Guest	Albero	Martinez	X
Guest	Alex	Ayala	X
Member	Alireza	Gorzin	X
Member	Amitabh	Sarkar	X
Guest	Amitkumar	Singh	X
Guest	Anastasia	O'Malley	X
Member	Andrew	Larison	X
Guest	Arvind	Kumar	X
Guest	Ashwin	Iyer	X
Guest	Ashwini	Labh	X
Guest	Balaji	Janakiraman	X
Guest	Benjamin	Guinand	X
Guest	Bernard	Labean	X
Member	Bill	Griesacker	X
Member	Bruce	Webb	X
Member	Carlos	Gaytan	X
Guest	Chanmin	Jeong	X
Chair	Daniel	Sauer	X
Member	Daniel	Blaydon	X
Guest	Daniel	Crockett	X
Guest	Dean	Park	X
Member	Dharam	Vir	X
Guest	Didier	Hamoir	X
Guest	Dinesh	Sankarakurup	X
Guest	Dumitru	Diaconu	X
Member	Dwight	Parkinson	X
Member	Ed	teNyenhuis	X
Member	Egon	Kirchenmayer	X
Guest	Egui	Espitia	X
Member	Emilio	Morales-Cruz	X
Guest	Enrique	Betancourt	X
Guest	Eric	Elson	X
Member	Evgenii	Ermakov	X
Member	Fernando	Tirado	X
Member	Francis	Mills	X
Guest	Fredy	murcig	X
Member	Gabriel	Delgado	X
Guest	Garrett	Bradshaw	X
Member	Gilles	Bargone	X
Guest	Goran	Milojevic	X
Member	Grace	Guang Yuan	X
Guest	Hyounggon	Ryu	X
Guest	Janet	Crockett	X
Member	Jason	Varnell	X
Guest	Jason	Snyder	X
Member	Javier	Arteaga	X
Guest	Jean Carlos	Hernandes Mejia	X
Guest	Jeremiah	Bradshaw	X
Member	Jerry	Murphy	X
Guest	Jerzy	Kazmierczak	X
Guest	Jesse	Duffy	X
Guest	Jesus	SanchezRodrigues	X
Guest	jiohao	xie	X
Member	Joe	White	X
Member	John	John	X
Guest	Jonathan	Reimer	X
Member	Jonathan	Sinclair	X
Guest	Jonathan	Tan	X
Guest	Jose	Izquierdo	X
Member	Jose Luiz	Machain	X
Member	Joseph	Tedesco	X
Guest	Joshua	Watson	X
Member	Joshua	Yun	X

Role	First Name	Last Name	2025 MAR
Guest	Josipa	Brekalo	X
Guest	Juan	Velasquez	X
Guest	Juan	Rodriguez	X
Member	Juan Alfredo	Carrizales	X
Member	Juan Carlos	Cruz Valdes	X
Guest	Kabir	Sethi	X
Member	Kayland	Adams	X
Guest	Komal	Laknai	X
Member	Kris	Zibert	X
Member	Kristopher	Neild	X
Member	Kurt	Kaineder	X
Vice-Chair	Marcos	Ferreira	X
Member	Kyle	Steckschulte	X
Guest	Laslo	Kadar	X
Guest	Leonard	Torchia	X
Guest	Libardo	Lopez	X
Guest	Logan	Merrill	X
Guest	Luc	Loiselle	X
Guest	Luya	Peuc	X
Guest	Marcelino	Perez	X
Guest	Mario	Alonso	X
Member	Mark	Newbill	X
Guest	Matija	Kopriunjak	X
Guest	Matthew	Weisensee	X
Guest	Matthew	Greenhaw	X
Member	Michael	Botti	X
Guest	Miguel	Fernandez	X
Member	Miguel	Garcia	X
Member	Miguel	Plascencia	X
Guest	Monil	Patel	X
Guest	Moonhee	Lee	X
Member	Nabi	Almeida	X
Guest	Namtran	Nguyen	X
Guest	Nick	Jensen	X
Member	Onome	Avanoma	X
Guest	Patrycja	Jaros	X
Member	Paul	Weyandt	X
Guest	Peter	Werelius	X
Member	Philip	Hopkinson	X
Member	Poorvi	Patel	X
Member	Pragnesh	Vyas	X
Guest	Prudvi	Bhattiprolu	X
Member	Qasim	Khan	X
Member	Ramadin	Issack	X
Member	Raymond	Frazier	X
Guest	Richard	vonGemmingen	X
Member	Rob	Ghosh	X
Guest	Ryan	Musgrove	X
Member	Ryan	Hogg	X
Guest	Salahuddin	Shaikh	X
Member	Samson	Debass	X
Member	Sanjib	Som	X
Member	Scott	Digby	X
Member	Scott	Reed	X
Guest	Shawn	Gossett	X
Member	Stephen	Antosz	X
Member	Stephen	Shull	X
Member	Steven	Snyder	X
Guest	Sunny	Swarna	X
Guest	Thomas	Propts	X
Guest	Thomas	Holifield	X
Member	Tim	Raymond	X
Member	Tim-Felix	Mai	X
Guest	Valori	Valentina	X
Guest	Vijay	Gunja	X
Guest	Vivian	Chan	X
Member	Weijun	Li	X
Guest	Yeounsoo	Kim	X

**Subsurface Transformers and Network Protectors Subcommittee
Task force / Working Group Report**

Chairman: **Tony Reiss**

Vice-Chair: **Nabi Almeida**

Meeting Date: **March 26th, 2025** **Location:** **Denver, CO** **Time:** **11:00 – 12:15 MST**

Meeting Administration:

- Sign In
- Chairman's Comments:
The chair called the meeting to order at 11:00, we started with chair remarks, the WG thanked George Payerle for his help with this SC. The chair requested C57.12.57 (not currently on the SC list) Brian Klaponski suggested this to be treated as a new business.
- Quorum Determination:
We asked for attendance to raise their hands to confirm membership and quorum evaluation, we had 23 members present and achieved quorum. Total attendance was 45 people.
- Member list:

Nabi	Almeida	Prolec GE
Alex	Ayala	Power Partners, Inc.
Jared	Bates	Oncor Electric Delivery
Piotr	Blaszczyk	Specialty Transformer Comp.
David	Blew	Retired (PSE&G)
Jeffrey	Brooks	Asplundh Engineering
Thomas	Dauzat	AEP-SWEPCO
William	Elliott	AEP-SWEPCO
Carlos	Gaytan	Prolec GE
Kenneth	Hampton	Baltimore Gas & Electric
Ramadan	Issack	American Electric Power
Brian	Klaponski	Carte International Inc.
Alejandro	Macias	CenterPoint Energy
Vinay	Patel	Consolidated Edison Co. of NY
George	Payerle	Carte International Inc.
Clemens	Reiss IV	Custom Materials, Inc.
Dan	Schwartz	Quality Switch, Inc.
Adam	Sewell	Quality Switch, Inc.
Jeremy	Sewell	Quality Switch, Inc.
Alan	Traut	Howard Industries
John	Vartanian	National Grid
Joshua	Verdell	ERMCO
Michael	Zarnowski	Carte International

Subsurface Transformers and Network Protectors Subcommittee Working Group Report

- Guest List:

Kevin	Biggie	Weidmann Electrical Tech.
Jim	Cai	JSHP
Janet	Crockett	Fayetteville PWC
Rich	Cryer	Digital Grid
Sanford	Fong	Georgia Power Co.
Alan	Fujimori	Romagnole
Yazmin	Galindo	Quality Switch, Inc.
Gilberto	Garza	Prolec
Matthew	Green-haw	OG&E
Kendrick	Hamilton	ERMCO
Patrycja	Janosz	IEEE SA
Adam	Klaponski	Carte International
Nicholas	Koinis	CenterPoint Energy
Parry	Lively	Tempel
Nicholas	Manske	Oncor Electric Delivery
Curtis	Moore	Digital Grid
Hugo	Murillo	H-J Family of Companies
Joe	Schumack	Ameren
Russell	Sewell	Quality Switch, Inc.
Stefan	Siebert	Brockhaus
Timothy	Tillery	Howard Industries
Stephen	Wolback	Alabama Power

- Present agenda for approval
Agenda unanimously approved, motion by Tom Dauzat, seconded by George Payerle
- Approval of the Fall 2024 St. Louis, MO minutes
Minutes unanimously approved, motion by George Payerle, seconded by Will Elliott
- Announce new STNP members: Jared Bates
- New committee members:
- WG chairs remember if it is not in the minutes, it did not happen at your meeting.
- Does anyone request SC membership? Indicate on roster.
2 individuals requesting membership. One approved.

Subsurface Transformers and Network Protectors Subcommittee Working Group Report

Working Groups Report:

- **C57.12.23 Single-Phase Submersible Transformers** working group –
- Alan Traut, Chairman; Noah Chesser, Vice Chair; Alex Macias, Secretary
 - Revision due date: 12/31/2028
 - PAR Approval Date: 2/15/24
 - PAR Expiration Date: 12/31/28

Stage: Working on standard

WG remarks: Al Traut report the WG met, there was no quorum. He reported the WG had a good discussion and a new business was proposed but could not be voted for due to the lack of quorum. Discussion on the LV terminals, the WG has the intention of combining the current 2 tables into one. There was discussion on the problem that happens when using non mag hardware on current carrying terminals, and the WG agreed to add a note calling this to the attention of the users.

Minutes from WG Meeting:

PC57.12.23 – Single Phase Submersible Transformers

Monday, March 24, 2025 11:00 AM Denver, Colorado USA

Chair: Alan Traut, Howard Industries

Vice-Chair: Noah Chesser, Oncor Electric Delivery

Secretary: Jared Bates, Oncor Electric Delivery

Call to Order

The meeting was called to order by the Chair at 11:00AM MST on Monday, March 24, 2025.

Essential patent statement and copyright slides

There was a call for essential patent claims by the Chair. There were none brought forward. The Chair announced if there was one to inform the Chair. The IEEE copyright slides were shown to the WG. No copyright issues were identified in the material presented at the meeting.

Chair Report

C57.12.23 was published in 2018 and will expire in 2028. The present PAR was approved 2-15-2024 and expires 12-31-2028 so there are 5 in-person meetings available to work on the revision. This being the third in-person meeting. The chair is targeting to vote to send the document to ballot in Fall of 2027.

Membership & Quorum

Total attendance was 57, with 30 of 60 members, 27 guests with 9 of those guests requesting membership. This was our third meeting, so no one is in jeopardy losing membership at this point. Quorum was not met. The attendees are listed below. The Secretary will work with absent members to verify they still want to be members so that we can meet quorum in the future.

Subsurface Transformers and Network Protectors Subcommittee Working Group Report

First Name	Last Name	Company or Affiliation	Role	First Name	Last Name	Company or Affiliation	Role
Nabi	Almeida	Prolec GE	Member	Fernando	Meza	Power Partners	Member
Stephen	Ashcraft	Hitachi Energy	Guest	Curtis	Moore	Digital Grid, INC.	Guest
Alex	Ayala	Power Partners	Guest	Charles	Morgan	Eversource Energy	Guest
Jared	Bates	Oncor Electric Delivery	Member	Tyler	Morgan	Duke Energy	Member
Piotr	Blaszczuk	Specialty Transformer Components	Member	Daniel	Mulkey	Mulkey Engineering Inc.	Member
Jeffrey	Brooks	Aselundt Eng	Member	Martin	Munoz	Orto	Member
Christopher	Brown	San Diego Gas & Electric	Guest	Hugo	Murillo	HJ Family of Companies	Guest
Jim	Cai	JSHP Transformer	Member	Ismael	Naja	Eaton Corp	Guest
Noah	Chesser	Oncor Electric Delivery	Vice Chair	Daniel	Oh	Hyundai	Guest
Matthew	Chisholm	IFD Technologies	Guest	Nurudeen	Olayiwola	PECO Excelon	Guest
Paul	Chisholm	IFD Technologies	Guest	Joel	Pacas	IFD Technologies	Guest
Craig	Colopy	Eaton Corp (Retired)	Guest	Besjan	Pajaziti	Brockhaus Measurements	Guest
Douglas	Craig	Richards Mfg	Guest (R)	Tihomir	Pandza	Siemens Energy	Guest
Janet	Crockett	Fayetteville PWC	Guest	Vinay	Patel	Con Edison of NY	Member
John	Crotty	Ameren Services	Guest	George	Payerle	Carte International Inc.	Member
Rich	Cryer	Digital Grid, INC.	Guest	Goran	Plisic	Siemens Energy	Guest
Tim	Dappen	Cargill	Guest	Daniel	Posadas	Prolec Celeco	Member
Thomas	Dauzat	AEP - SWEPCO	Guest	Jarrood	Prince	ERMCO	Member
Tony	DiBiase	Temple (Canada)	Guest	Ion	Radu	Hitachi Energy	Guest
Qusai	Elnimri	Vantran Transformer	Guest	James	Ratty	Richards Mfg	Guest (R)
Hugo	Flores	ERMCO	Guest	Martin	Rave	IFD Technologies	Guest
Sanford	Fong	Georgia Power	Member	Robert	Reepe	Georgia Power Co.	Guest
Chris	Franklin	MG Power Associates	Guest	Tony	Reiss	Custom Materials Inc	Guest
John	Fraser	IFD Technologies	Guest	David	Rohrer	First Energy	Member
Kevin	Frye	Central Moloney Inc	Guest	Mason	Rush	Central Moloney	Member
Yazmin	Galindo	Quality Switch	Guest (R)	Mike	Saannon	REA Magnet Wire	Guest (R)
Benjamin	Garcia	Southern California Edison	Member	Pedro	Salgado	Richards Mfg	Guest (R)
Gilberto	Garza	Prolec GE	Guest (R)	Fernando	Salinas	Power Partners	Member
Hector	Garza	Orto	Guest	Stefan	Schindler	Mashinenfabrik Reinhausen	Guest
Carlos	Gaytan	Prolec GE	Member	Joseph	Schumack	Ameren Services	Guest
Ali	Ghafourian	H-J Family of Companies	Member	Jeremy	Sewell	Quality Switch	Guest
Stephen	Gilbert	IFD Technologies	Guest	Russ	Sewell	Quality Switch	Guest
Michael	Gonzales	Southern California Edison	Member	Jaber	Shalabi	Vantran Transformer	Guest
Christian	Gottschalk	City of Fort Collins	Guest	Audrey	Siebert-Tim	IFD Technologies	Member
Luke	Grandbois	IFD Technologies	Guest	Igor	Simonov	Toronto Hydro	Member
Kendrick	Hamilton	ERMCO	Guest	Chris	Slattery	First Energy	Guest
Kenneth	Hampton	Baltimore Gas & Electric	Member	Jimmy	Smith	Howard Industries	Member
Michael	Hardin	HJ Family of Companies	Guest	Steve	Snyder	Hitachi Energy	Guest
Ramadan	Issack	American Electric Power	Member	Jim	Spaulding	City of Fort Collins	Guest
Rebecca	Kim	Cheryong Electric	Guest	Shankar	Subramany	KEMA Netherlands	Member
Adam	Klaponski	Carte International Inc.	Member	Jesse	Theberge	Temple (Canada)	Guest
Brian	Klaponski	Carte International Inc.	Member	Michael	Thibault	Pacific Gas & Electric	Member
Nicholas	Koinis	CenterPoint Energy	Guest	Tim	Tillery	Howard Industries	Member
Nihat	Kosedogi	ERMCO	Guest	Fernando	Tirado	Prolec GE	Guest (R)
Gilbert	Kozer	Northeast Transformer	Member	Alan	Traut	Howard Industries	Chair
Patrick	Kozer	Northeast Transformer	Member	Steve	Tsai	JST Power Equipment	Member
Kang	Lee	Chenyong Electric	Guest (R)	Reinaldo	Valentin	Duke Energy	Member
Angela	Leigl	EATON Corporation	Guest	Jeremy	Van Horn	IFD Technologies	Member
David	Lin	IFD Technologies	Guest	John	Vartanian	National Grid	Member
Parry	Lively	Temple	Guest	Joshua	Verdell	ERMCO	Guest
Alejandro	Macias	CenterPoint Energy	Secretary	Hector	Villa	Ecuatran SA	Guest (R)
Nicholas	Manske	ONCOR Electric Delivery	Member	Shelby	Walters	Howard Industries	Member
Katherine	Marvlanda	Magnetron	Guest	Bruce	Webb	Knoxville Utilities Board	Member
Nader	Masoud	Central Moloney	Guest	Alan	Wilks	Consultant	Guest
Mohammed	Megdad	IPS	Guest	Samuel	Young	Hitachi Energy	Guest
Tim	Menter	Lincoln Electric System	Guest	Michael	Zarnowski	Carte International Inc.	Member

Subsurface Transformers and Network Protectors Subcommittee Working Group Report

Approval of Agenda

Skipped approval of the agenda since we did not meet quorum.

Approval of previous meeting minutes

Skipped approval of the previous meeting minutes since we did not meet quorum.

Old Business

- Clause 7.1 General
 - Added reference to C57.12.53 Guide for mitigating corrosion on subsurface transformers and network protectors. While this is currently a draft, 12.53 WG plans to go to ballot after the spring 2025 meeting so it should be published before 12.23 goes to ballot in late 2027.
- Clause 7.4.1 Mitigation of Galvanic Corrosion (new clause by Tom Dauzat)
 - This is the proposal of the new clause that Tom suggested. The new clause was read aloud. Al asked if the addition of this new material was appropriate, and if so, is it in the correct place? Vinay Patel (Con Ed.) said that C57.12.53 is not yet published and to make sure that it is published before we make any change. It should be published before our standard, but if not, we will refer to it as a draft. Brian Klaponski (Carte) recommended doing a straw ballot to see where the support is at on the proposal, and a majority supported adding this into the document. Carlos Gayton (Prolec GE) mentioned that some customers use silicon bronze pressure relief valves with a stainless tanks and Tom said that there will still be galvanic corrosion but it won't be as bad.
- Proposed clause 6.2 for C57.12.23/D3 Dielectric Tests – Al Traut
 - Al proposed his rewording of the clause in a word document. Alex Macias commented that C57.12.34 is also going to propose a rerouting of this section and also has a table on it and that we should be sure to have common terminology. Al replied that C57.12.38 has this same wording and likewise in C57.12.20 has the same language. No other comments. Al will put this proposed clause in the next draft and we'll take action on it at that time.
- 7.2.3 Low-Voltage Terminals (Proposed)
 - Al showed the present clause and said there really isn't an issue there but wanted to look at the tables. Currently in Table 4 which has the low-voltage terminal size which is a lookup by kVA and voltage and it tells you what terminal to use. In the stud figure there is another lookup table by kVA and voltage that tells you what stud to use. This requires to look at two tables to come up with plate terminal description. We want to align it with C57.12.24 for three phase submersibles. Combining and organizing the table in the same way will align better. No objections.
 - On 120 V column for 167 and 250 kVA we specify a 1.25" stud but we also have an H-spade but in other standards they specify a J-spade. Josh Verdell (ERMCO) commented that those sizes with 120 V secondary are very uncommon. Al stated that another option would be to state "N/A" for these sizes. Jim Spaulding (City of Fort Collins) stated that the largest size with 120 V secondary used at Fort Collins is a 75 kVA. We will re-visit the 120 V rating for 167 and 250 kVA when we have a quorum.
 - Tom Dauzat requested that a label stating "avoid using magnetic hardware on electrical bolted connections" be added because it will create a magnetic field around that bolt and end up loosening up overtime. This includes the ground as well. Al said this gets into

Subsurface Transformers and Network Protectors Subcommittee Working Group Report

a grey area, where does the scope start and stop because the manufacturer is not installing the bolts. A note at the end of this clause could be appropriate. Brian added that it could offer a recommendation on what to use. Al and Tom are going to work on coming up with something to add by the next meeting.

- Figure 1:
 - We have a 2 bushing loop feed for a grounded wye unit or a 2 bushing radial feed unit for a phase to phase connected unit. Do we need to address in this document phase to phase connected units with loop feed (4 bushing)?
- Jim Spaulding, City of Fort Collins, said that that they just have them all radial at the end because in case of an outage it's a minimal number of customers out.
- No other comments were made.
- We will not pursue adding 4 HV bushing units to Figure 1.
- Clause 7.2.2 High-voltage connectors states "For specific details concerning high-voltage separable connectors and cable accessory parking stands, refer to IEEE Std 386". Al said that Std 386 doesn't cover parking stands. Every other standard that uses separable connectors has a drawing of a parking stand but we don't. We should add one. No objections. Chair will add the new figure and strike "and cable accessory parking stands" from 7.2.2.
- Under Clause 7.3.1 regarding terminal markings the sentence "the terminal markings shall be on stainless steel plates and fastened with non-corrosive hardware and shall be distinctly readable from distance of 2.44 m (8 ft) from the transformer" was copied from C57.12.24. After discussion the WG felt that this is not widely used on single phase submersibles and the stainless steel plate requirement should be deleted.
- Over Current Protection – On single phase submersibles, in the past we built units with under oil weak links, where the user knows the fault current is very low, because if the fuse operates the transformer is shorted. Do we want to include it in here or leave it be? Brian Klaponiski, CARTE, said to include weak link fuses. Is anyone making these with bayonets and an isolation link? Brian said for the most part updated specs call for the current limiting unless it's an older spec.
- Tom Dauzat asked if manufacturers use 400 series stainless steel for nameplates and tags. We will draft something to specify the nameplate and any metal identification tags be made from 300 series stainless steel.
- Discussion stopped at 7.6 Tanks as we ran out of time.

New Business

Next Meeting Announcement

October 20, 2025 in Bonita Springs, Florida USA

Adjourn

The meeting adjourned at 12:15PM MST

Submitted by
Jared Bates
WG Secretary

**Subsurface Transformers and Network Protectors Subcommittee
Working Group Report**

- **C57.12.24 Three-Phase Submersible Transformers** working group –
Ben Garcia, Chairman; Tom Dauzat, Vice Chair; George Payerle, Secretary
 - Published: 2023
 - Revision Due Date: 12/31/2033
 - PAR Approval Date:
 - PAR Expiration Date:

On break. Not meeting at this time

WG remarks: The WG did not met, the SC Chair called WG Vice-chair Tom Dauzat to report on status. The C57.12.24 is recently published and currently has no active PAR.

- **C57.12.40 Secondary Network Transformer** working group –
John Vartanian, Chairman; Dan Schwartz, Secretary
 - Published 2024
 - Revision due date: 12/31/2034
 - PAR Approval Date:
 - PAR Expiration Date:

Stage: Standard recently published but meeting for potential presentations

WG Remarks: Standard recently published, there was a discussion about the need to go for another PAR, and there was a presentation, Chair currently do not have any other presentation lined up for the next meeting.

Minutes from WG Meeting:

- 1) The group met on Tuesday, March 25, 2025 at 11:00 AM MST with 22 members and 19 guests. Six (6) guests requested membership. Quorum was achieved with 22/31 (71%) of members present.
- 2) A call for patents was made; none were mentioned.
- 3) Copyright requirements were reviewed by the Chair.
- 4) Introductions were made by all attendees.
- 5) The agenda and previous minutes from October 29, 2024 were presented for approval. Motion to approve was made by Adam Sewell and seconded by Brian Klaponski. The agenda and minutes were approved unanimously.
- 6) Old Business
 - a. C57.12.40-2024 was published in May 2024
- 7) New Business
 - a. The Chair made a request of the group for potential improvements to be made to the standard during the next revision cycle:
 - i. Tom Dauzat stated he would like to see some mention or warning for hardware used when connecting/securing current carrying elements that they need to be non-magnetic and potentially corrosion resistant depending on application.

Subsurface Transformers and Network Protectors Subcommittee Working Group Report

- ii. Will Elliott followed-up on the previous discussion to begin referencing the corrosion guide that will be published in the next 2-3 years.
- iii. The Secretary will revisit the previous listing from the last revision to include items discussed, but shelved.
- iv. Tom Dauzat brought up referencing SKATE protocol for transformer identification and whether or not the group should include this in the next revision.
- v. The Chair made a request for anyone willing to fill a Vice Chair position for future meetings.
- vi. Based on the presentation about hydrogen monitoring, the group discussed either referencing the DGA guide or creating an informative Annex on DGA application to network transformers.
- b. Presentation on continuous hydrogen monitoring was made by Bill Whitehead, which was informative and produced a good Q&A session.
- c. The Chair agreed to bring hydrogen monitoring examples to the next meeting to show application of the presented materials.

The meeting was adjourned at 11:43 AM MST with the next meeting set for Bonita Springs, FL on October 21, 2025.

<u>Members Present</u>		<u>Affiliation</u>
Nabi	Almeida	Prolec GE
Mario	Alonso	Georgia Transformer
Piotr	Blaszczyk	Specialty Transformer Components
David	Blew	DS Blew Consulting LLC
Jeffrey	Brooks	Asplundh Engineering Services
Douglas	Craif	Richards Mfg
Thomas	Dauzat	AEP-SWEPCO
Will	Elliott	AEP SWEPCO
Sanford	Fong	Georgia Power
Patrick	Kozer	Northeast Transformer Services
Patrick	Kozer	Northeast Transformer Services
Gilbert	Kozer	Northeast Transformer Services LLC
Alejandro	Macias	CenterPoint Energy
Vinay	Patel	Con Edison
George	Payerle	Carte International
James	Ratty	Richards Manufacturing
Pedro	Salgado	Richards Manufacturing
Danny	Schwartz	Quality Switch
Adam	Sewell	Quality Switch
Jeremy	Sewell	Quality Switch, Inc.
John	Vartanian	National grid
William	Whitehead	Reinhausen

Subsurface Transformers and Network Protectors Subcommittee Working Group Report

- **C57.12.44 Secondary Network Protectors** working group –
Mark Faulkner, Chairman; Alex Macias, Secretary
 - Revision due date: **12/31/2024**
 - PAR Approval Date: **3/26/2015**
 - PAR Expiration Date:

Stage: Submitted to Revcom – Not Meeting

WG Remarks: Alex Macias reported that the document has been approved and will be published soon

- **C57.167 Guide for Monitoring Distribution Transformers** working group –
Gary Hoffman, Chairman; Mike Thibault, Secretary
 - Revision due date: **N/A – new standard**
 - PAR Approval Date: **6/14/2018**
 - PAR Expiration Date: **12/31/2022**

Stage: Published – not meeting

WG Remarks: No remarks or comments

- **C 57.12.53 Guide for mitigating corrosion on subsurface transformers** working group -
Will Elliott, Chair; Michael Zarnowski, Vice-chair; Audrey Siebert-Timmer, secretary
 - PAR Approval Date: **2/23/2022**
 - PAR Expiration Date: **12/31/2026**

Stage: In process

WG Remarks: WG Chair Will Elliott reported that the WG met and had quorum, there was a review on the tech changes and the WG made a motion to send the Draft to SA Ballot which was unanimously approved. The CRG was created. Will Elliott made a motion to request SC approval to send Draft#4e for SA Ballot, unanimously approved by the SC.

Minutes of WG meeting:

Attending Members:

Nabi Almeida, Prolec GE
Thomas Dausat, AEP - SWEPCO
Will Elliott, AEP - SWEPCO
Ramadan Issack, American Electric Power
Brian Klaponski, Carte International Inc.
Alejandro Macias, Centerpoint Energy
Tyler Morgan, Duke Energy

George Payerle, Carte International Inc.
Dan Schwartz, Quality Switch, Inc.
Adam Sewell, Quality Switch, Inc.
Jeremy Sewell, Quality Switch, Inc.
Reinaldo Valentin, Duke Energy
John Vartanian, National Grid
Michael Zarnowski, Carte International Inc.

Attending Guests:

Alex Ayala, Power Partners

Samuel Brodeur, Hitachi Energy

**Subsurface Transformers and Network Protectors Subcommittee
Working Group Report**

Gilberto Garza, Prolec GE
Carlos Gaytan, Prolec GE
Patrycja Jarosz, IEEE SA
Adam Klaponski, Carte International Inc.
Kang Jin Lee, Cheryong Electric
Nicholas Manske, Oncor Electric Delivery
Justin Minikel, Eaton

Dean Park, Hyosung HICO
Nicholas Post, WEC Energy Group
Joseph Shumack, Ameren
Juan Velasquez, Magnetron SAS
Hector Villa, Ecuatran SA
Shelby Walters, Howard Industries

Subsurface Transformers and Network Protectors Subcommittee Agenda

Meeting Minutes:

1. Will Elliott called the meeting to order at 3:16 PM MST.
2. Opening remarks and introductions were made.
 - i. Attendance was taken electronically using a QR code. Paper rosters were circulated to supplement electronic attendance records.
3. Will Elliott reviewed IEEE SA Copyright Policy, Essential Patent Claims, and Code of Ethics & Conduct. No issues were raised.
4. Membership changes were noted:
 - i. Added: **Jeffrey Door, Ramadan Issack, and Alejandro Macias.**
 - ii. Changed to Guest: **Javier Arteaga, Douglas Craig, Herton De Oliveira Filo, Daniel Mulkey, Verena Pellon, Liz Sullivan**
5. Quorum was verified. The working group consisted of **26** members, requiring **14** for quorum. **12** members were counted at the start of the meeting (no quorum). Also passed around paper roster to confirm membership
 - i. Quorum was later reconfirmed and **14** members were present, resulting in a quorum.
6. Old Business:
 - i. Will Elliott noted the last meeting concluded with a motion accepting all changes up to section 6.2.1 in the draft. He further noted that based on subsequent feedback from the Fall 2024 meeting that it was recommended by several people to simply accept a motion to accept all changes proposed to the draft guide, rather than review all changes line-by-line. Will Elliott later notified the working group by email on 8 December 2024 that it was his intention to follow that guidance and only review key points in remaining changes to the revised guide proposed by the task-force and included the latest draft guide with all modifications made from the Fall 2024 meeting. He reviewed some of the changes
 - a. **Large changes to stainless steel**
 - b. Coordinating the materials of fittings
 - c. Submersion criteria
 - d. Additional ASTM standards
 - e. Cathodic protection
 - f. Measuring effectiveness of cathodic protection
 - g. Editorial corrections, misspelled severe, labelled a figure a table, and bibliography references were corrected
 - ii. **December 8th the draft was sent to the group, editorial corrections were shared a week prior to the meeting**

Subsurface Transformers and Network Protectors Subcommittee Agenda

7. Will Elliott requested approval of the Fall 2024 Minutes. **Thomas Dautat made a motion to approve the Fall 2024 Minutes. Second by Nabi Almeida. Motion was unanimously approved.**
 8. Will Elliott requested approval of the Spring 2025 Agenda. **Adam Sewell made a motion to approve the Spring 2025 Agenda. Second by Alejandro Macias. Motion was unanimously approved.**
 9. **Dan Schwartz made a motion approve to move the Draft #D4e to the IEEE Standards Sponsor ballot, and that a Comment Resolution Group be formed with the authority to resolve editorial and technical ballot comments. Second by Adam Sewell. Motion was unanimously approved.**
 - i. **Comment Resolution Group is as follows:**
 - a. **Nabi Almeida**
 - b. **Thomas Dautat**
 - c. **John Vartanian**
 - d. **Will Elliott**
 - e. **Michael Zarnowski**
 10. New Business:
 - i. No new business was discussed.
 11. **The meeting was adjourned at 3:46 PM MST.**
 12. Next meeting: October 21, 2025 in Bonita Springs, Florida, USA.
- Submitted by: Will Elliott
- Date: 3/31/2025

Subsurface Transformers and Network Protectors Subcommittee Agenda

Old Business:

- Leadership Change – Tony Reiss, Chair; Nabi Almeida, Vice-Chair. Thank you, George, for many years guiding the Subcommittee.
- George encouraged the use of Collabratec
- Alicia Farag – Presentation on SCATE P3476

New Business:

- Discuss C57.12.57 at the next meeting, send an email poll if would make sense to request if work on this standard is necessary to the users. Al Traut suggested we expand the poll to include the Dry Type Standard group members.

Next meeting:

Wed October 22, 2025 at 11 AM EST Bonita Springs, FL