

IEEE Power and Energy Society Entity Annual Report

2023

Entity: Transformers Committee
Website: www.transformerscommittee.org
Chair: Ed teNyenhuis
Vice-Chair: David Wallach
Secretary: Bill Griesacker
Immediate Past Chair: Bruce Forsyth

1. Significant Accomplishments:

1.1. *Committee Structure*

The Transformers Committee manages about 115 standards through 12 standards development subcommittees, 1 administrative subcommittee, and 1 meeting planning subcommittee. The following figure shows the current subcommittees. An asterisk (*) indicates a subcommittee that does not develop standards.

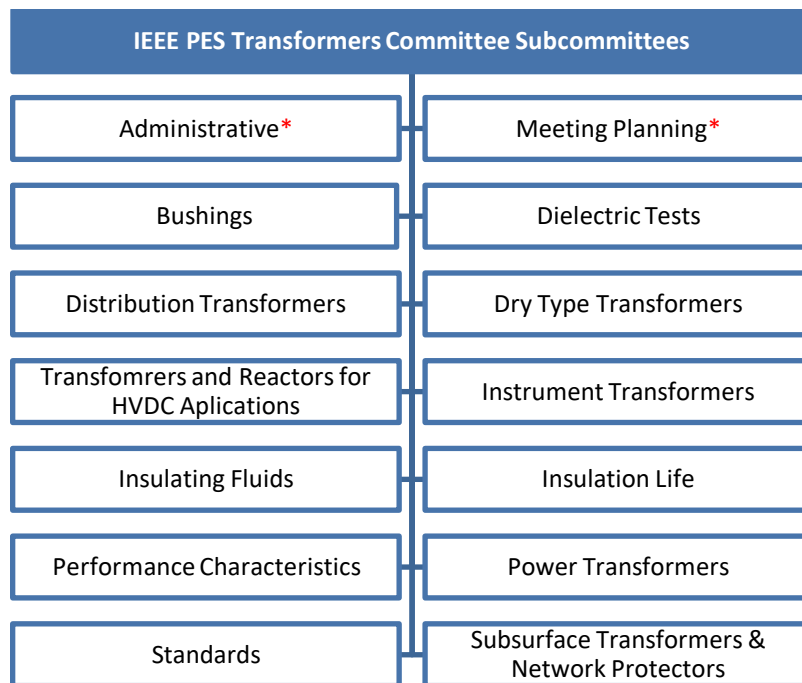


Figure 1: Transformers Committee Subcommittee List

1.2. Committee Meetings

The Transformers Committee held two meetings in 2023:

- Spring meeting was held in Milwaukee Wisconsin on March 19 – 23, 2023.
- Fall meeting was held in Kansas City Missouri on October 22 – 26, 2023.

The Transformer Committee has the below firm dates and venues for future meetings:

Meeting	Location	Date
Spring 2024	Vancouver, BC, Canada	March 10-14, 2024
Fall 2024	St Louis, MO, USA	October 27-31, 2024
Spring 2025	Denver CO, USA	March 23-27, 2025

1.3. New Voting Members

Twelve new voting members were approved by the Administrative Subcommittee during 2023 bringing the current number of voting members to 237. Figure 2 shows the total number of voting members after each of the Spring (S) and Fall (F) committee meetings.

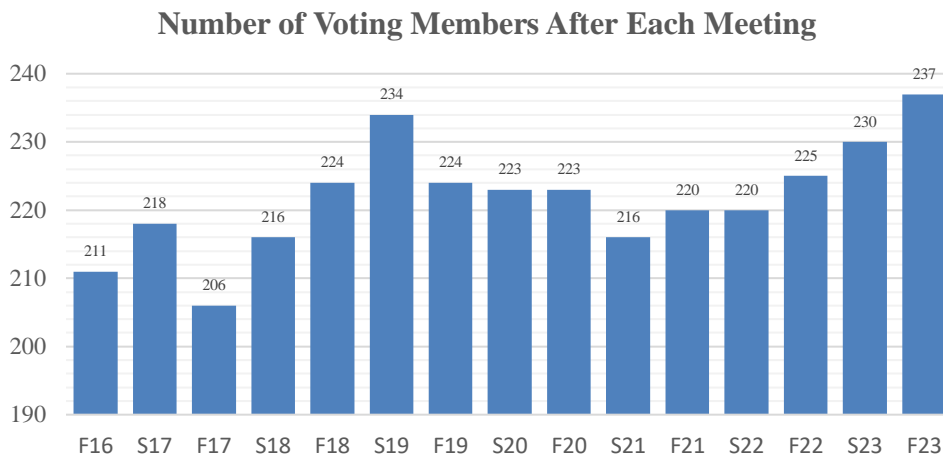


Figure 2: Number of Voting Members After Each Meeting

1.4. Standards Activity

During 2023, 6 revisions, 2 new standards and 1 corrigenda were completed and approved by the Standards Association Board. In addition, the Standards Association Board approved 1 PAR for a new standard, 10 PARs for revision, and 19 PARs for extensions.

As of December 31, 2023, there were 65 active PARs distributed as follows:

PARs – revision	48
PARs – new	15
PARs – amendments	2

During the Spring 2023 Committee meeting in Milwaukee, WI and the Fall 2023 Committee meeting in Kansas City, MO, approximately 75 subcommittee, working group, and task force meetings were held over 3 ½ days. Administrative Subcommittee meetings were held on the first day of each Committee meeting.

A list of the activity groups that met during the Fall 2023 meeting is shown below:

GENERAL:

- Administrative SC
- Transformers Committee Main Meeting
- Newcomers Orientation
- Meetings Planning S

WORKING GROUPS/TASK FORCES:

Bushing SC

- WG Bushing Application Guide C57.19.100
- TF Std Require for Bushings C57.19.01

Distribution Transformers SC

- TF Transformer Efficiency & Loss Evaluation (DOE Activity)
- WG 1-ph Padmount Distribution Transf. C57.12.38
- WG 3-ph Padmount Distribution Transf. C57.12.34
- TF Tank Touch Temperatures
- WG Encl Int C57.12.28, C57.12.29, C57.12.31, C57.12.32
- WG Distribution Substation Transformer PC57.12.36
- WG Bar Coding for Distribution Transformer C57.12.35
- WG Req for Distribution Transformer Tank Pressure Coordination C57.12.39

Dielectric Test SC

- TF Partial Discharge Tests for Class I Transformers
- TF DFR Test Guide C57.161
- WG Transformer Impulse Test Guide PC57.98
- TF on Revision of Impulse Tests C57.12.00 & C57.12.90
- TF Detection of Acoustic Emissions from PD C57.127
- TF Cont. Revision to Low Frequency Tests C57.12.90
- WG Recommend Practice for Routine Impulse Tests C57.138

Dry Type SC

- WG Dry Type Gen. Requirements C57.12.01
- TF Test for Eval of Insulation for Dry-Type Transformers IEEE 259
- WG Practice for Install & Operation of Dry Type PC57.94
- WG Guide for Loading Dry Type Transformers C57.96
- WG Dry Type Test Code C57.12.91

Instrument Transformers SC

- WG Power-Line Carrier Coupling Cap & Volt Transf. C57.13.9
- TF Instrument Transf. Accuracy
- WG Requirements for Instrument Transformers PC57.13
- TF to Merge C57.13.5 into C57.13

Insulating Fluids SC

- WG Guide for DGA in Silicone PC57.146
- WG Guide for DGA Applied to Factory Temp Rise Test C57.130
- TF Guide for the Reclamation of Mineral Oil C57.637

- WG Guide DGA in Ester-Immersed Transformers PC57.155
- TF Test Method for Max Continuous Temp of Ins Liquid
- WG Guide for DGA in LTCs C57.139

Insulation Life SC

- WG Loading Guide PC57.91
- WG App of High-Temp Insulation Materials IEEE 1276 Annex B
- TF Continuous Rev Clause 11 Temp Rise Tests C57.12.90

Transformers and Reactors for HVDC Application SC

- No WG or TF meetings

Performance Characteristics SC

- TF CO2 Emissions in the Construction of Transformers
- TF Audible Sound Revision to Test Code
- TF PCS Cont. Revisions to C57.12.00
- TF Inverter Transformer Precautions on Ground Shields C57.159
- TF PCS Cont. Rev. to Test Code C57.12.90
- WG Switching Transients Ind by Transformer/Breaker Interaction PC57.142
- Guide for App of Tertiary & Stabilizing Windings C57.158
- WG Neutral Grounding Devices C57.32

Power Transformers SC

- WG Guide for Tank Rupture Mitigation C57.156
- WG Standard Requirements for Tap Changers - C57.131
- WG Class 1E Transformers for Nuclear Power Gen Std. 638
- WG Guide for Phase Shifting Transformers C57.135
- WG Transformer Monitoring C57.143
- WG Failure Investigation & Reporting PC57.125
- WG Condition Assessment Guide PC57.170
- WG Guide for Life Tests of Switch Contacts C57.157
- WG Standard Requirements for Arc Furnace Transf. C57.17
- WG Volts per Hertz C57.107
- TF Guide for Install & Maintenance of Power Transformers C57.93
- WG Guide for Paralleling Transformers C57.153

Standards SC

- TF IEEE-IEC Cross Reference
- WG Std Transf. Terminology C57.12.80
- WG Guide for Field Testing PC57.152
- TF Reverse Power Flow Effects on Trans

STNP SC

- WG Sec. Network Protectors C57.12.44
- WG Liquid-immersed Sec. Network TRs C57.12.40
- WG Guide for Mitigating Corrosion on Sub Transformer C57.12.53

1.5. PES Conferences

The Transformer Committee was involved in the below 2023 IEEE PES conferences:

- 2023 IEEE PES Grid Edge Technologies Conference and Exhibition, April 10 - 13, 2023, San Diego, California - The Transformer Committee had 1 paper.
- 2023 IEEE PES General Meeting, July 16 - 20, 2023, Orlando, Florida - The Transformer Committee had 6 papers.

1.6. Technical Tutorials

The Transformer Committee presents technical tutorials on timely industry subjects at the Spring and Fall meetings. The tutorials have multiple technical experts as presenters and are comprehensive. These tutorials are well attended, and all past tutorials (40+) can be found on the Transformer Committee website. These tutorials are excellent technical reference resources for the industry. Below are 4 tutorials presented in 2023:

- *DOE NOPR for Distribution Transformers Efficiency Requirements and its Implications*
- *Innovative Solutions to Increase Overload Capability for Oil and Dry-Type Transformer Bushings*
- *IEEE Guide for Dielectric Frequency Response Measurements of Bushings*
- *IEEE Guide for Physical Security of Electric Power Substations*

2. Benefits to Industry and PES Members from the Committee Work:

The Transformers Committee is one of the largest and most active technical committees of the IEEE Power and Energy Society (PES). The continuing scope of the Committee is to develop and update standards and guidelines for the design, testing, repair, installation, operation and maintenance of transformers, reactors and associated components that are used within electric utility and industrial power systems. The Committee is made up of technical and managerial representatives from manufacturers, consultants, vendors and end users of electrical transformers and components. Participating in Transformer Committee activities provides the opportunity to network with industry experts from around the world, to share and learn about non-proprietary or otherwise unprotected technology, and to generally assist in the globalization of industry standards. This privilege allows participants to remain informed of the latest trends and developments in the transformer industry.

Participants benefit from learning opportunities, such as sharing ideas and seeking input from other engineers and technical people facing similar technical challenges to their own. Tutorials are offered to provide growth opportunities as well as opportunities for participants to share their own knowledge and experiences by volunteering to be a tutorial presenter. Tutorials are recorded and available in a password-protected area of the Committee's website for reference by Committee participants and their financial sponsors.

A privilege to all participants and a responsibility of Committee members is to review papers submitted for presentation at various IEEE PES sponsored events. Reviewing papers is an important service to the authors and the industry and allows reviewers access to state-of-the-art information and developments.

3. Benefits to Volunteer Participants from the Committee Work:

A primary benefit to volunteer participants is the opportunity to actively take part in the development of the standards that govern the transformer industry. This participation leads to a well-deserved sense of pride as well as advanced awareness of upcoming changes during the development stages. Each of the 70+ active groups have a Chair and a Secretary, and most also have a Vice Chair. The Committee's Policies and Procedures for Standards Development manual includes term limits for responsible Subcommittee Chair positions, so opportunities for new people to get involved at a higher level are periodically available. All subcommittee, working group, and task force activities are open to any volunteer who is interested in participating.

The ability to meet with other industry experts, hear about the challenges faced by others, and to listen to how problems were solved helps all volunteers grow technically and to be more effective at solving the challenges faced by their individual employers.

The Committee's Standards Coordinator typically offers presentations during one of the lunch breaks focused on providing subcommittee, working group, and task force current and future leaders with information related to standards development, such as the standards development processes, Roberts Rule of Order, and the Committee's Association Management System (AMS) capabilities. These presentations help activity leaders become more effective in their respective roles and help to ensure the integrity of the standards development process is maintained.

4. Recognition of Outstanding Performance:

Transformers Committee awards are typically given to recipients during an awards luncheon at the Spring and Fall meetings. The following awards were presented:

4.1. Outstanding Service Awards

For long-term commitment, dedication, and contributions to the Transformers Committee, an Outstanding Service Award was presented to each of the following recipients:

George Frimpong
Aleksandr (Sasha) Levin
Zoltan Roman
Diego Robalino

4.2. IEEE Standards Association Standards Board Working Group Awards

In addition to the Committee Awards above, the IEEE Standards Association Standards Board (SASB) presents its own award to the WG Chair upon publication of a new or revised document and offers the WG Chair the opportunity to nominate significant contributors to the project for an IEEE SASB Certificate of Appreciation. Awards were presented to the following for their contributions to the referenced document:

4.2.1. *IEEE Std C57.12.200™-2022 – IEEE Guide for the Dielectric Frequency Response Measurement of Bushings*

- *Entity Working Group Chair: Jun Deng*
- *Transformers Committee Representative: Poorvi Patel*
- *Entity Members: Peter Werelius, Diego Robalino, Mario Locarno, Ronald Hernandez, Mickel Saad, Ismail Guner, Charles Sweetser, Evgenii Ermakov, Peter Zhao*

4.2.2. *IEEE Std C57.100™-2022 – IEEE Standard Test Procedure for the Thermal Evaluation of Insulation Systems for Liquid-Immersed Distribution, Power and Regulating Transformers*

- *WG Chair: Roger Wicks*
- *Vice Chair: Kevin Biggie*
- *Certificates of Appreciation: Stuart Chambers, George Frimpong, Saramma Hoffman, Sasha Levin, Jinesh Malde, Alan Sbravati*

4.2.3. *IEEE Std C57.116™-2022 – IEEE Guide for Transformers Directly Connected to Generators*

- *WG Chair - Weijun Li*
- *Vice Chair: Jason Varnell*
- *Secretary: Bill Griesacker*
- *Certificates of Appreciation - Shankar Nambi, Toby Johnson, Ryan Hogg, Kayland Adams, Joe Watson, John K John, Kipp Yule*

4.2.4. *IEEE Std C57.19.00™-2023 – IEEE Standard for General Requirements and Test Procedure for Power Apparatus Bushings*

- *WG Chair - Peter Zhao*
- *WG Vice Chair - Eric Weatherbee*
- *Certificates of Appreciation - J. Arturo Del Rio, Scott Digby, David Geibel, Sebastian Riopel, Shibao Zhang*

4.2.5. *IEEE Std C57.19.02™-2023 – IEEE Approved Draft Standard for the Design and Performance Requirements of Bushings Applied to Liquid Immersed Distribution Transformers*

- *WG Chair - Steve Shull*
- *WG Vice-Chair - Ed Smith*
- *WG Secretary - Rhett Chrysler*
- *Plaques - Fred Friend, Dan Sauer, David Geibel, Al Traut, Martin Rave, Carlos Gaytan, Barry Beaster, Lee Tyler*
- *Certificates of Appreciation - James Spaulding, Luis Osorio, Huan Dinh, Weijun Li, Jeff Door, Israel Barrientos, Marek Kornowski*

4.3. *Memorials*

Sadly, during 2023 we lost 8 past participants for whom memorials were added to the Committee's Memorials page. Each of these great individuals contributed to the past success of the Transformers Committee and helped build the foundation upon which we continue to grow. Memorials were added for the following:

Said Hachichi
Keith Ellis
Don Ballard
Ray Bartnikas
Don Duckett
Lars-Erik Juhlin
Harold Moore
Ken Skinger

5. **Coordination with Other Entities (PES Committees, CIGRE, standards, etc.):**

The Transformers Committee coordinates with several other PES committees, national and international technical committees, and national and international standards development organizations (SDO's), including ASTM, CIGRE, IEC, CSA, NFPA, NEC, SCC4, Doble, NERC/FERC, and EPRI. This effort includes joint sponsorship of standards with IEC, and established liaisons with CIGRE, IEC TC14, ASTM D27, and SCC4 to support significant activity and the exchange of technical information and keeping each other informed of the latest technology advancements.

6. **New Technologies of Interest to the Committee:**

The new technologies of interest to the transformers committee continue to be the ongoing growth and changes in monitoring systems and their application in relation to the transformer industry. A desire to provide transformer users with actionable data in a timely manner that helps identify potential problems before they result in unplanned outages or catastrophic failures drives much of the development.

The huge increase expected in renewable energy will disrupt the flow of electricity in the power grid, which will impact transformers, which for the most part were designed for flow in only one direction. The Transformers Committee has approved to prepare a new guide to address this concern, termed "reverse power flow", in new and existing transformers.

The expected massive growth of renewable energy to meet global CO2 emissions will have a significant impact on existing and new transformers. The Transformers Committee has approved to prepare a new guide for CO2 emissions life cycle calculation of transformers.

7. Global Involvement

The Transformers Committee has a diverse group of participants from all around the world. Table 1 shows a few participant statistics, with particular emphasis on regions 8, 9, and 10 (Africa, Europe, Middle East, Latin America, Asia and Pacific) which are target regions for PES to increase member involvement.

Table 1: Regions 8, 9, and 10 Participation Statistics

Total number of committee members	Officers from regions 8, 9 and 10	Subcommittee officers from regions 8, 9 and 10	Subcommittee members from regions 8, 9, and 10
237	0	1 SC, 10 WG	23

8. Problems and Concerns:

The loss of the Association Management System (AMS) and the 123Signup platform continues to hamper the management of activity rosters/attendance and coordinating meeting registration. Attendance records and rosters are presently being done manually for each activity and without central consolidation.

9. Significant Plans for the Next Period:

The Transformer Committee expects to see increasing attendance at the 2024 meetings and will monitor that the Committee continues to have the diversity of technical knowledge and experience needed for standards development. This will include successful succession planning and sufficient opportunities for continued growth of new leaders.

The Transformers Committee would like to increase involvement of women in leadership and standards development. The officers hosted a breakfast with women attending the Fall 2023 meeting to discuss this objective. The Transformers Committee will continue this focus in 2024.

Submitted by: Ed teNyenhuis

Date: January 27, 2024