

IEEE Power and Energy Society Entity Annual Report

2022

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.

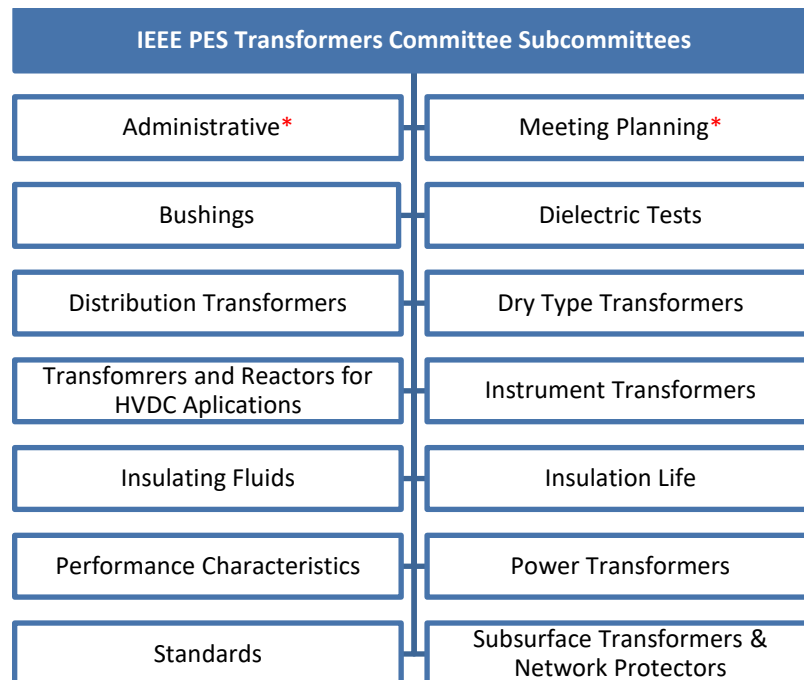


Figure 1: Transformers Committee Subcommittee List

1.2. Committee Meetings

The Transformers Committee held two in person meetings in 2022:

- Spring meeting was held in Denver, CO on March 27 – 31, 2022.
- Fall meeting was held in Charlotte, NC on October 16 – 20, 2022.

In-person meetings were restarted in 2022 after holding virtual meetings during the COVID-19 pandemic. The Spring 2022 meeting had less attendance than past meetings, however the Fall 2022 meeting was back to normal attendance levels (500 – 600 persons).

The Transformer Committee has the below firm dates and venues for future meetings. Preliminary plans are in place for 2024 and 2025 meetings as well.

<u>Meeting</u>	<u>Location</u>	<u>Date</u>
Spring 2023	Milwaukee, WI, USA	March 19-23, 2023
Fall 2023	Kansas City, MO, USA	October 22-26, 2023

1.3. New Voting Members

Seven new voting members were approved by the Administrative Subcommittee during 2022 bringing the current number of voting members to 225. Figure 2 shows the total number of voting members after each of the Spring (S) and Fall (F) committee meetings.

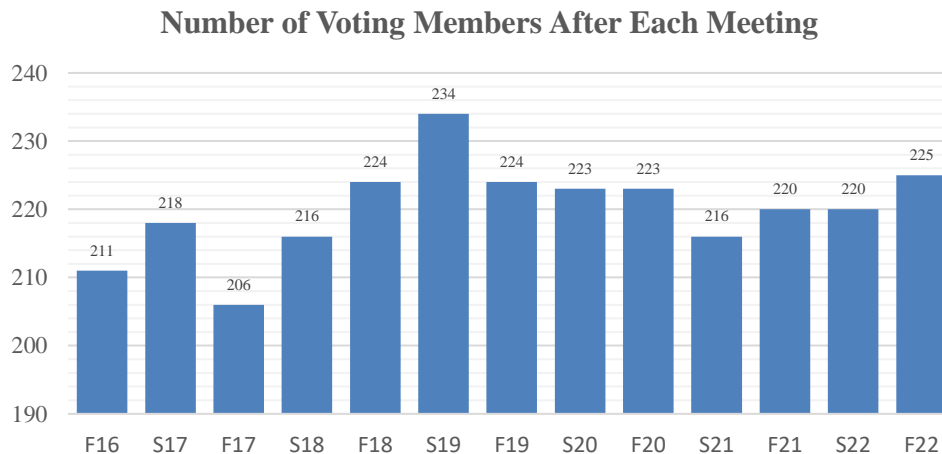


Figure 2: Number of Voting Members After Each Meeting

1.4. Standards Activity

During 2022, 4 revisions and 1 new standard were completed and approved by the Standards Association Board. In addition, the Standards Association Board approved 3 PARs for new standards, 11 PARs for revision, and 3 PARs for extensions. As of December 31, 2022, there were 66 active PARs distributed as follows:

PARs – revision.....	45
PARs – new	17
PARs – corrigenda.....	2
PARs – amendments	2

During the Spring 2022 Committee meeting in Denver, CO and the Fall 2022 Committee meeting in Charlotte, NC, approximately 75 subcommittee, working group, and task force meetings were held over 3 ½ days. An Administrative Subcommittee meeting was held the week before the Committee meeting.

A list of the activity groups that met during the Fall 2022 meeting is shown below:

GENERAL:

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

WORKING GROUPS/TASK FORCES:

Bushing SC

- WG PC57.19.02 – Distribution Transformer Bushings
- WG 65700.19.03 – Bushings for DC Applications
- WG PC57.19.100 – Bushing Application Guide

Distribution Transformers SC

- WG PC57.12.20 – Overhead Distr. Transf.
- WG Encl Int (C57.12.28, C57.12.29, C57.12.31, C57.12.32)
- WG PC57.12.34 – 3-ph Padmount Dist Transf.
- WG PC57.12.35 – Bar Coding for Dist Transf.
- WG PC57.12.38 – 1-ph Padmount Dist Transf.
- WG PC57.167 – Guide for Monitoring Distr Transf
- TF Tank Touch Temperatures
- TF on Trans. Efficiency & Loss Eval. (DOE Activity)

Dielectric Test SC

- WG PC57.98 – Transformer Impulse Test Guide
- WG PC57.113 – Partial Discharge Test
- WG PC57.160 - PD Measure HV Bushings & Inst Trf
- WG PC57.168 – Low Frequency Test Guide
- TF on Cont. Revision to Low Frequency Tests
- TF on Cont. Revision to Impulse Tests
- TF on Partial Discharge Tests for Class I Transformers
- TF Core Ground & Winding Insulation Resistance - Perf & Int.

Dry Type SC

- WG PC57.12.01 – Dry Type General Requirements
- WG PC57.16 – Dry Type Reactors
- WG PC57.12.91 – Dry Type Test Code
- WG PC57.94 – Practice for Installation and Operation
- WG PC57.12.96 – Guide for Loading Dry Type Trans.
- WG PC57.124 – Dry Type PD Detection
- TF IEEE 259 – Test for Evaluation of Insulation

Instrument Transformers SC

- WG PC57.13.9 – PLC Caps & CCVTs
- WG PC57.13 - Requirements for Instrument Trans.
- TF – Instrument Transformer Accuracy

Insulating Fluids SC

- WG PC57.13 - Guide for DGA Applied to Factory Temp Rise Test
- WG PC57.146 – Guide for Interpretation of Gasses in Silicone
- WG PC57.155 – Guide for DGA in Ester-Immersed Transformers
- WG PC57.166 – Consolidation Insulating Fluid Guides
- WG PC57.637 – Guide for Reclamation of Mineral Oil
- WG PC57.139 – Guide for DGA in LTCs.

Insulation Life SC

- WG PC57.91 – Loading Guide
- TF P1276 Annex B – App’n of High Temp Ins’n Mat’l

- TF Cont. Revision to C57.12.90, §11 – Temp Rise Test

Transformers and Reactors for HVDC App'n SC

- No WG or TF meetings

Performance Characteristics SC

- WG PC57.142 – Transients Due to Breaker Interaction
- WG PC57.149 – Guide for FRA
- WG PC57.105 - Guide for App of Transf. Connections Corrig.
- TF – PCS Continuous Revisions to C57.12.00
- TF – PCS Continuous Revisions to C57.12.90
- TF - Audible Sound Revs & WG Sound Guide C57.136
- TF - Inverter Transf Precautions on Ground Shields C57.159

Power Transformers SC

- WG PC57.107 - Volts per Hertz
- WG PC57.116 – Guide for Transformers Directly Connected to Generators
- WG PC57.125 – Failure Investigation & Reporting
- WG PC57.131 – Std. Requirements for Tap Changers
- WG PC57.135 - Guide for Phase Shifting Transf
- WG PC57.143 – Transformer Monitoring
- WG PC57.170 – Condition Assessment Guide
- TF Guide for Tank Rupture Mitigation C57.156

- TF Guide for Life Tests of Switch Contacts C57.157
- TF Standard Requirements for Arc Furnace Transf. C57.17
- TF Guide for Install & Maintenance of Power Trf C57.93
- TF Guide for Paralleling Transformers C57.153

Standards SC

- WG PC57.12.80 – Standard Transf. Terminology
- WG PC57.152 – Guide for Field Testing
- WG PC57.163 – Geomagnetic Disturbances

STNP SC

- WG PC57.12.24 – Submersible Transformers
- WG PC57.12.40 – Liquid-immersed Secondary Network Transformers
- WG PC57.12.53 - Guide for Mitigating Corrosion on Sub Trfs

1.5. PES Conferences

The Transformer Committee was involved in the below 2022 IEEE PES conferences:

- 2022 IEEE PES T&D Conference, April 25 - 28, 2022, New Orleans, LA - The Transformer Committee had 10 papers, 2 panel sessions (titled “*Dual Nameplate kVA Distribution Transformers*” and “*Significant revisions made to C57.104, the IEEE Guide for the Interpretation of Gases Generated in Mineral Oil-Immersed Transformers*”) and 1 tutorial session (titled “*Digital condition-based Asset Management Systems*”).
- 2022 IEEE PES General Meeting, July 17 - 21, 2022, Denver, CO - The Transformer Committee had 4 papers and 1 panel session titled “*Impact of Geomagnetically Induced Current (GIC) on Power Transformers and Power Systems*”.

A total of 1 paper was assigned to the Transformers Committee in 2022 for review for the 2023 PES Grid Edge Technologies Conference & Exposition. This paper is still under review.

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 the 4 tutorials presented in 2022:

- *A New Dual Nameplate kVA Distribution Transformers - Part 1 and Part 2*
- *Impact of GIC on Power Transformers and Power Systems – Case Studies*
- *Grid-Ready Flexible Transformers*

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 has 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. *IEEE SA Standards Medallion*

Bestowed upon individuals for major contributions to the development of standards. This was awarded to Stephen Antosz, who asked to be recognized with his peers at the Fall 2022 Transformer Committee meeting.

4.2. *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:

William Boettger

Eduardo Garcia Wild

Hemchandra Shertukde

4.3. *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:

4.3.1. *IEEE Std C57.12.00™-2021 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*

- WG Chair - Steve Snyder
- Certificates of Appreciation - Stephen Antosz, Phil Hopkinson, Ajith Varghese, Bill Griesacker, David Walker, Ramsis Girgis, Rogerio Verdolin, Tauhid Ansari

4.3.2. *IEEE Std C57.12.90™-2021 - IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers*

- WG Chair - Steve Antosz
- Plaques - Bertrand Poulin, Hakan Sahin, Bill Griesacker
- Certificates of Appreciation - Jerry Murphy, Pierre Riffon, Sheldon Kennedy, Peter Balma, Ramsis Girgis, Steve Snyder, Phil Hopkinson, Rogerio Verdolin

4.3.3. *IEEE Std C57.164™-2021 - IEEE Guide for Establishing Short-Circuit Withstand Capabilities of Liquid-Filled Power Transformers, Regulators, and Reactors*

- WG Chair - Sanjay Patel
- WG Vice Chair - Raj Ahuja
- WG Secretary - Joe Watson
- Certificates of Appreciation - Jane Vernor

4.3.4. *IEEE Std C57.18.10™-2021 - IEEE Standard Practices and Requirements for Semiconductor Power Rectifier Transformers*

- WG Chair - Sheldon Kennedy
- WG Vice-Chair - William Whitehead
- WG Secretary - David Walker
- Certificates of Appreciation - Charles Johnson, Philip Hopkinson, Vijay Tendulkar, Donald Ayers, Richard Marek, John John, Sanjib Som

4.3.5. *IEEE Std C57.34™-2021 - 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*

- WG Chair - Stephen Shull
- Plaques – Michael Dahlke, Carlos Gaytan, Jerry Murphy
- Certificates of Appreciation - Babanna Suresh, Christopher Sullivan, Daniel Mulkey, Gary King, Irving Antweiler, Igor Simonov, Jeff Schneider, Pragnesh Vyas

4.3.6. *IEEE Std C57.154™-2021 - IEEE Standard for Liquid-Immersed Transformers Designed to Operate at Temperatures Above Conventional Limits Using High-Temperature Insulation Systems*

- WG Chair – Rick Marek
- Plaques - Anastasia O'Malley, Ewald Schweiger, Alan Sbravati, Kevin Biggie
- Certificates of Appreciation - Claude Beauchemin, Stuart Chambers, George Frimpong, Rainer Frotscher, Attila Gyore, Marion Jaroszewski, Aleksandr Levin, Jinesh Malde, Radoslaw Szewczky

4.4. *Memorials*

Sadly, during 2022 we lost 3 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:

David Traux

Alan Darwin
 Vinay Mehrotra

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.

Solid state transformer design is another area of interest to the Transformers Committee. While solid state transformers incorporate traditional transformers, they also incorporate power electronics that are outside the scope of the Transformers Committee. Effective development of industry standards for these devices will require the coordination of multiple technical committees.

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 is expecting development of industry standards to facilitate renewable energy, electric vehicles, battery storage and subsequent substantial changes to the power grid.

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
225	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.

Standards work did slow down during the COVID pandemic as evidenced by the large number of PAR extension requests in 2022. The publication of several new and revised standards was delayed. It is hoped that this will improve in 2023.

9. Significant Plans for the Next Period:

The Transformer Committee expects large attendance in the 2023 meetings (back to past normal) 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 (several senior members retired during the COVID pandemic) and sufficient opportunities for continued growth of new leaders.

Submitted by: Ed teNyenhuis

Date: January 5, 2023