IEEE Power and Energy Society
Entity Annual Report

2021

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

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. Despite the challenges presented by the COVID-19 pandemic, progress continued to be made on active standards during 2021 through the effective use of electronic (virtual) meetings by working groups and task forces. The following figure shows the current subcommittees. An asterisk (*) indicates a subcommittee that does not develop standards.

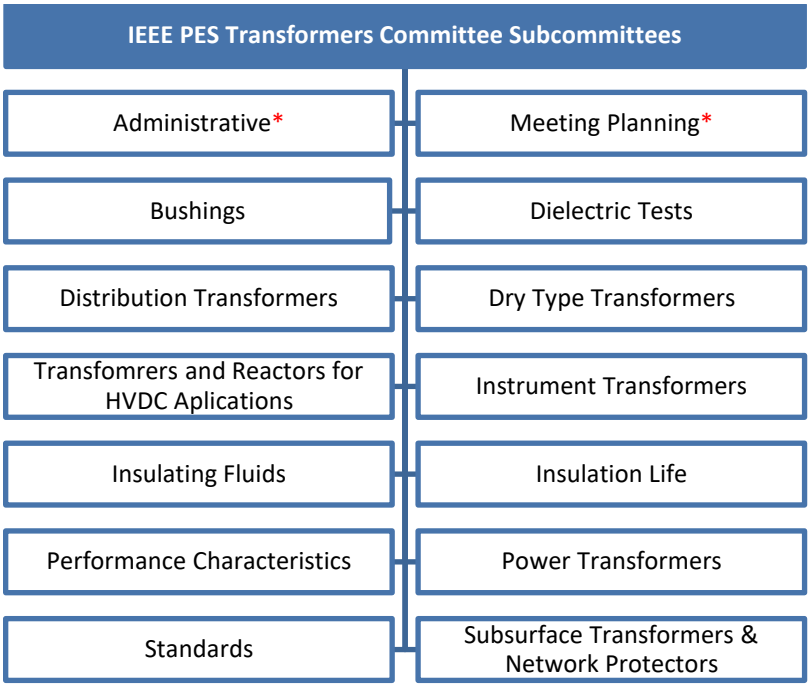

Figure 1: Transformers Committee Subcommittee List

1.2. Virtual Committee Meetings

The Transformers Committee held two meetings in 2021. Despite a desire to meet face-to-face it was necessary for both meetings to be held virtually. Fortunately, the Committee was able to cancel hotel contracts without a financial penalty.

1.3. New Voting Members

Six new voting members were approved by the Administrative Subcommittee during 2021 bringing the current number of voting members to a 3-year high of 226. Figure 2 shows the total number of voting members after each of the spring (S) and fall (F) committee meetings.

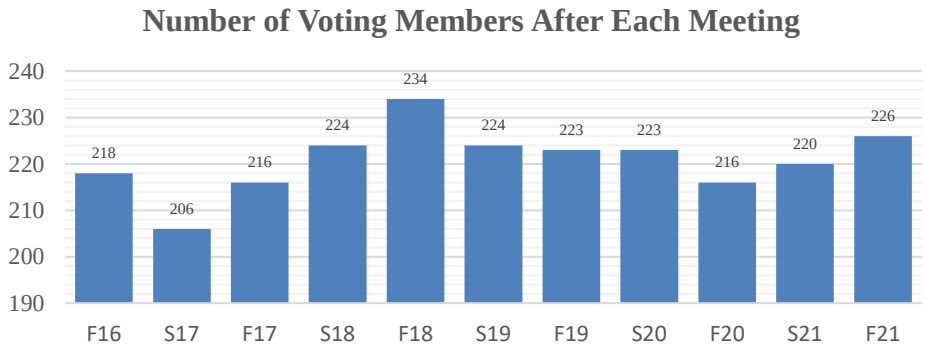

Figure 2: Number of Voting Members After Each Meeting

1.4. Standards Activity in 2021

During 2021, 4 revisions and 1 new standard were completed and approved by the Standards Association Board. In addition, the Standards Association Board approved 4 PARs for new standards, 6 PARs for revision, and 13 PARs for extensions. As of December 31, 2021, there were 57 active PARs distributed as follows:

PARs – revision..... 38
PARs – new..... 16
PARs – corrigenda..... 2
PARs – amendments 1

During the Fall 2021 virtual Committee meeting a total of 77 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 2021 meeting is shown below:

GENERAL:

- Administrative SC (held the week before)
- Transformers Committee Main Meeting
- Newcomers Orientation (pre-recorded)
- Meetings Planning SC (pre-recorded)

WORKING GROUPS/TASK FORCES:

Bushing SC

- WG PC57.19.00 – Bushings Gen. Requirements
- WG PC57.19.02 – Distribution Transformer Bushings
- WG 65700.19.03 – Bushings for DC Applications
- WG PC57.19.100 – Bushing Application Guide
- TF on Dry Bushing Class and Perf.

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 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 Measurement in HV Bushings and Instrument Transformers
- WG PC57.168 – Low Frequency Test Guide
- TF Liaison to WG PC57.12.200 – Frequency Response Measurement of Bushings
- TF on Cont. Revision to Low Frequency Tests
- TF on Cont. Revision to Impulse Tests
- TF on Winding Insulation PF
- TF on Partial Discharge Tests for Class I Transformers

Dry Type SC

- WG PC57.12.01 – Dry Type General Requirements
- WG PC57.16 – Dry Type Reactors
- WG PC57.12.52 – Sealed Dry-Type Transformers
- 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 PC57.134 – Guide for Hottest Spot in Dry Type
- TF IEEE 259 – Test for Evaluation of Insulation

Instrument Transformers SC

- WG PC57.13.8 – Station Service Voltage Transf.
- WG PC57.13.9 – PLC Caps & CCVTs
- TF – Instrument Transformer Accuracy

Insulating Fluids SC

- 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
- TF PC57.104 – Next Revision to C57.104 Guide for Interpretation of Gasses
- TF PC57.637 – Guide for Reclamation of Mineral Oil
- TF PC57.139 – Guide for DGA in LTCs.

Insulation Life SC

- WG PC57.91 – Loading Guide
- WG PC57.100 – Thermal Evaluation
- WG PC57.154 – High Temp Liquid Transformers
- WG PC57.165 – Temp Measurement
- TF – Temp Rise Other than Windings (C57.12.00, § 5.11.1.4)
- 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
- TF – PCS Continuous Revisions to C57.12.00
- TF – PCS Continuous Revisions to C57.12.90
- TF – Audible Sound Level Revisions to C57.12.90

Power Transformers SC

- 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 PC57.143 – Transformer Monitoring
- WG PC57.170 – Condition Assessment Guide
- TF – Volts per Hertz

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 PC57.12.44 – Sec. Network Protectors
- TF – Effects of Corrosion on Transformers

1.5. Conference Papers Reviewed

A total of 13 papers were assigned to the Transformers Committee in 2021 for review for the 2022 T&D Conference and Exhibition. Of the 13 papers submitted, 9 were accepted.

1.6. Meetings

The Transformers Committee holds two meetings each year, one in the spring and one in the fall. Historically these have been in-person meetings, but due to the COVID-19 pandemic both meetings in 2021 were converted to virtual meetings. Registration for virtual meetings has been just slightly lower than for past in-person meetings.

Feedback from members about the virtual meetings has been mixed. Early in the pandemic members were pleased with the switch to virtual meetings, but recent feedback shows many members desire in-person meetings again. Those in favor of in-person meetings identify the benefits of the interactions that take place in-between meetings, both personal and professional, as a primary reason for wanting to meet in-person. There is an expectation that strict COVID protocols will be put in place if in-person meetings occur.

Prior to the pandemic, registration at each of the in-person spring and fall Committee meetings had increased to well over 500 people and over 600 people for some meetings. Locating venues that can accommodate meetings of 600+ attendees over a period of several days can be a difficult challenge. To address this the Transformers Committee has had to book hotels over a year in advance and had contracts in place for the four meetings scheduled in 2020 and 2021 prior to the pandemic. One of those meetings was cancelled and the other three were converted to virtual meetings. One of the hotel contracts was cancelled outright, and three were rescheduled to dates beyond the Spring 2022 meeting, which was already booked. As result, the Transformers Committee has hotel contracts in place for the next 4 meetings. The following list shows meetings that are now firm, subject to our ability to hold in-person meetings:

Meeting	Location	Date
Spring 2022	Denver, CO, USA	March 27-31, 2022
Fall 2022	Charlotte, NC, USA	October 16-20, 2022
Spring 2023	Milwaukee, WI, USA	March 19-23, 2023
Fall 2023	Kansas City, MO, USA	October 22-26, 2023

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 abreast 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 in-person meetings. The Spring 2021 Awards Ceremony was pre-recorded for registrant to watch at their convenience. The Fall 2021 Awards Ceremony was offered as a live WebEx-based presentation. The following awards were presented in 2021:

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:

Craig Colopy	Phil Hopkinson
Sheldon Kennedy	James Thompson

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 C57.12.01™-2020 – IEEE Standard for Submersible Equipment – Enclosure Integrity Distribution and Power Transformers

WG Chair: Robert (Casey) Ballard
WG Secretary: Aleksandr Levin

Certificates of Appreciation:

Mike Iman	Charles Johnson
Tim-Felix Mai	Rhea Montpool
Dhiru Patel	Joseph Tedesco
David Walker	

4.2.2. IEEE Std C57.12.23™-2018 – 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

WG Chair: Alan Traut
WG Vice Chair/Secretary: Jermaine Clonts

4.2.3. IEEE Std C57.12.60™-2020 – IEEE Standard for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers

WG Chair: Roger Wicks
WG Vice Chair: David Stankes

Certificates of Appreciation:
Tim-Felix Mai
Casey Ballard
Kenneth McKinney

4.2.4. IEEE Std C57.12.70™-2020 – IEEE Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers

WG Chair: Jason Varnell
WG Secretary: Kris Zibert
TF Chair: Stephen Antosz
TF Chair: Weijun Li

Certificates of Appreciation:

Glenn Andersen	Lee Mathews
Tyler Morgan	Dan Mulkey
Ryan Musgrove	Steven Schappell

4.2.5. IEEE Std C57.12.91™-2020 – IEEE Approved Draft Standard Test Code for Dry-Type Distribution and Power Transformers

WG Chair: David Walker
WG Secretary: Tim-Felix Mai

Certificates of Appreciation:

Robert (Casey) Ballard	Mohammad Iman
Charles Johnson	Rhea Montpool
Dhiru Patel	Joseph Tedesco

4.2.6. IEEE Std C57.13.5™-2019 – IEEE Standard for Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above

WG Chair: Pierre Riffon
WG Vice Chair: David Wallace

Certificates of Appreciation:

Lee Bigham	Huan Dinh
Vladmir Khalin	Deepak Kumaria
Ross McTaggart	Zoltan Roman
Andre Rottenbacher	Thomas Sizemore
Steven Snyder	Barrett Wimberly
Igor Ziger	

4.2.7. IEEE Std C57.32a™-2020 – Amendment to IEEE Standard for Requirements, Terminology, and Test Procedures for Neutral Grounding Devices

WG Chair: Sergio Panetta
WG Vice Chair: Yann Elessad
WG Secretary: Thomas Yingling

Certificates of Appreciation:

Bernard Audouard	Sinan Balban
Robert Berger	Sedat Corapsiz
Richard Field	Stuart Gibbon

Andrew Keith	Sheldon Kennedy
Todd Locker	Lodovico Mascardi
Edmundo Perich	Leslie Recksiedler
Pablo Sanchez	Ed teNyenhuis

4.2.8. IEEE Std C57.93™-2019 – IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers

WG Chair: Michael Lau
WG Vice Chair: Alwyn VanderWalt
WG Secretary: Scott Reed

Certificates of Appreciation:

Derek Baranowski	Wally Binder
James Graham	Susan McNelly
Donald Platts	Richard Simonelli
Joe Watson	

4.2.9. IEEE Std C57.104™-2019 – IEEE Guide for the Interpretation of gases Generated in Mineral Oil-Immersed Transformers (Published 6/2019)

WG Chair: Claude Beauchemin
WG Vice Chair: Don Platts
WG Vice Chair: Norman Field
WG Secretary: Sue McNelly

Certificates of Appreciation:

Paul Boman	Muhammad Ali Masood Cheema
Luiz Cheim	Donald Dorris
James Dukarm	Michel Duval
Marcos Ferreira	David Hanson
Kumar Mani	Richard Ladroga
Thomas Lundquist	Hali Moleski
Jerry Murphy	Arturo Nunez
Thomas Prevost	Robert Rasor
David Wallach	

4.2.10. IEEE Std C57.105™-2019 – IEEE Guide for Application of Transformer Connections in Three-Phase Electrical Systems (published 3/2020)

WG Chair: Rogerio Verdolin
WG Vice Chair: Ben Garcia

Certificates of Appreciation:

David Jacobson	John
Dan Mulkey	Samuel Sharpless
David Walker	

4.2.11. IEEE Std C57.109™-2018 – IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration

WG Chair: Vinay Mehrotra
WG Vice Chair: Hemchandra Shertukde
WG Secretary: Jason Varnell

4.2.12. IEEE Std C57.110™-2018 – IEEE Recommended Practice for Establishing Liquid Immersed and Dry-Type Power and Distribution Transformer Capability when Supplying Nonsinusoidal Load Currents

WG Chair: Richard Marek
WG Secretary: Samuel Sharpless

Certificates of Appreciation:

Robert (Casey) Ballard	Thomas Holifield
Aleksandr Levin	Tim-Felix Mai
Hasse Nordman	Alvaro Portillo
David Walker	

4.2.13. IEEE Std 1276™-2020 – IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Distribution, Power, and Regulating Transformers

WG Chair: Roger Wicks
WG Secretary: Javier Arteaga

Certificates of Appreciation:
C. Clair Claiborne
Marion Jaroszewski
Alan Sbravati

4.2.14. IEC/IEEE 60076-16™-2018 – IEC/IEEE International Standard - Power transformers - Part 16: Transformers for wind turbine applications

WG Chair: Phil Hopkinson
WG Secretary: Donald Ayers
Special Note of Appreciation to:

Robert (Casey) Ballard	Thomas Breckenridge
David Buckmaster	Paul Jarman
Joseph Mango	Joe Watson

(NOTE: Certificates of Appreciation from IEEE were not requested.)

4.3. Memorials

Sadly, during 2021 we lost 5 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:

Dr. Claire Claiborne
Jitka Fuhr
David Harris
Dr. Eddy So
Robert Veitch

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.

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
228	0	1 SC, 10 WG	23

8. Problems and Concerns:

8.1. Loss of the Association Management System

The loss of the Association Management System (AMS) and the 123Signup platform upon which it was built is a devastating blow to the Transformers Committee. The AMS was used extensively to manage activity rosters and attendance, as well as coordinating meeting registration. According to current estimates, the Transformers Committee's Spring 2022 meeting will be held before a replacement system is in place. This means other tools, which will likely more costly, will have to be used to manage registration. Attendance records and rosters will have to be manually updated until a new system is in place, raising the risk of data loss or inaccuracies. While manageable, these issues are a major inconvenience and create a significant amount of added work for our many volunteers. The Transformers Committee anxiously awaits the rollout of a replacement AMS.

8.2. Loss of Training Opportunities During Past 2-years

The virtual meetings held during 2020 and 2021 have been effective at keeping the standards development activities moving forward, but one thing that has been lost is the training opportunity that occurred during the Monday luncheons at past in-person meetings. The Monday luncheons were used to provide presentations on various topics related to the standards development process. These sessions helped familiarize working group leaders of some of the issues that can help them complete their tasks effectively. The last training session occurred at the fall 2019 meeting, and there are signs that some WG Chairs need more training and support. The Transformers Committee will endeavor to offer training sessions for activity leaders at all future meetings, whether they are in-person or virtual.

9. Significant Plans for the Next Period:

9.1. Future Virtual Meeting or Hybrid Meeting Plans

The Committee has several future meetings already planned with hotel contracts signed. The success of the virtual meetings held in 2020 and 2021 has raised interest in having more virtual meetings in the future. However, many participants have stated they value the personal interactions and networking opportunities presented during in-person meetings. Many people, particularly those who must travel long distances to attend in-person meetings, have asked the Committee to investigate the feasibility of holding true hybrid meetings where remote attendees can actively participate in discussions and decisions. The Committee will be studying its long-term meeting planning approach to find a good balance between cost, convenience, and over-all meeting value.

Submitted by: Bruce Forsyth **Date: January 24, 2022**