IEEE Power and Energy Society
Transformers Committee Annual Report

2019

Entity: Transformers Committee (www.transformerscommittee.org)

Chair: Susan McNelly
Vice-Chair: Bruce Forsyth
Secretary: Ed teNyenhuis
Standards Coordinator: Jim Graham
Treasurer: Paul Boman
Past-Chair: Stephen Antosz

1. Significant Accomplishments:

The committee continues to hold two independent committee meetings each year in the spring and fall. Through a continuous effort to improve meeting content and structure, as well as promoting meetings, meeting participation has grown by approximately 35% in the last 10 years. Current meetings have roughly 600 attendees and 75 guests.

2019 Conference Papers:

IEEE PES General Meeting, Atlanta, GA, August 4 - 8
Papers: 12 Submittals, 11 Accepted

New members In 2019, 14 new voting Committee members were approved. The new members represent manufacturers, product users, labs, and consultants in the industry. Over the last 5 years, the Transformers Committee has added an average of 17 new voting members each year.

The Committee website includes a memorial page honoring long time contributors to the Committee's work that have passed away. In 2019, memorials were added for Robert Degeneff, John Luksich, Walter Seitlinger, Ron Stahara, & Dean Yannucci.

Standards Activities in 2018

Active PARs: 62
PARs approved by NESCOM: 12 (2 for new individual, 10 for revision, and 0 for new entity)

Stds/Guides moved to inactive: 4 (2 intentionally, 2 expired due to missed deadlines, but have active PARs and work continues)

Approved Standards/Guides: 8 (1 new, 7 revised)

Standards/Guides in Ballot Stage: 14 (8 completed ballot, 6 in ballot as of 12/31/2019)

Technical Tours

Two technical tours were conducted in 2019, continuing the committee's efforts to combine the theoretical/standardized aspects with the practical requirements of manufacturing transformers and utility equipment.

Weidmann Electrical Grade Paper Mill provided a tour of their paper manufacturing facilities in Urbana, Ohio providing members with an opportunity to further their understanding of paper insulation manufacturing and the ties to transformer standards and their applications.

AEP provided an opportunity to see their Transmission Training Center.

Technical Activities

The Transformers Committee sponsors the following twelve technical subcommittees (SC), as well as an Administrative SC and a Meetings Planning SC focused on continuous meeting improvement.

- Bushings
- Dielectric tests
- Distribution transformers
- Dry-Type Transformers
- HVDC Converter Transformers and Smoothing Reactors
- Instrument transformers
- Insulating Fluids
- Insulation Life
- Performance Characteristics
- Power Transformers
- Standards
- Subsurface Transformers and Network Protectors

Other Committee and Subcommittee Activities:

There was a total of **152** committee WG, TF, and SC meetings in 2019, not including electronic meetings held to further work between the main meetings. Attendance at these meetings is excellent, and usually with a quorum of members to facilitate major technical and procedural decisions requiring approvals. The meetings illustrated below, in addition to the above listed SCs, indicate the large volume of meetings and the breadth of the ongoing Transformers Committee work. The committee also supported 5 additional meetings for NEMA, IEC TC 14 and the Electric Power & Light Delegation (EL&P). All meetings provide a forum for meeting participants to conduct their work, have meaningful dialog, resolve technical issues, and plan for the future direction of the committee.

GENERAL:

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

WORKING GROUPS/TASK FORCES:

Bushing SC

- WG Bushing Applicat. Guide C57.19.100
- WG Bushings Gen. Require. C57.19.00
- WG Distrib. Transf. Bushings PC57.19.02
- TF Bushing Overload - Complete in 2019

Distribution Transformers SC

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

Dielectric Test SC

- WG Low Frequency Test Guide C57.168
- WG Partial Discharge Test - C57.113
- WG PD Measurement in HV Bushings and Instr TRs C57.160
- WG Transformer Impulse Test Guide PC57.98
- TF Cont. Rev to Imp. Test C57.12.90
- TF Cont. Revision to Low Frequency Tests
- TF Freq Domain Spectroscopy of Bush. C57.12.200 - Entity
- TF on Winding Insulation PF
- TF Partial Discharge Tests for Class I Transformers
- TF PD Limits for Factory Tests

Dry Type SC

- WG Dry Type Gen. Requirements C57.12.01
- WG Therm Eval of Insul Systems, Dry Type C57.12.60
- WG Dry Type Test Code C57.12.91
- WG Dry Type Reactors PC57.16
- WG Dry Type PD Detection PC57.124
- TF PC57.12.52 PAR Development
- TF Std Test Procedures IEEE 259

Insulating Fluids SC

- WG Gas Interpretation Guide C57.104
- WG Consolidation Insulating Fluid Guides PC57.166

Insulation Life SC

- WG Loading Guide PC57.91
- WG Thermal Evaluation C57.100
- WG High Temp Liquid Transformers C57.154
- WG Moisture in Insulation PC57.162
- WG Temp Measurement PC57.165
- WG Determine Max Winding Temp Rise PC57.169
- WG High-Temp Insulat. Materials, P1276
- TF Temp Rise Test Procedures C57.12.90, Clause 11

Instrument Transformers SC

- WG Instrument Transf. Tests PC57.13.2
- WG Tests for Instrument Transf. C57.13.5
- WG Station Service Volt. Transf. C57.13.8
- WG PLC Caps & CCVTs PC57.13.9
- TF Instrument Transf. Accuracy

HVDC SC

- WG Semicond. Power Rectifier Transfs C57.18.10
- WG Shunt Reactors C57.21
- WG Neutral Grounding Devices Amendment C57.32a
- WG HVDC Converter Neutral Devices Entity PC 57.32.10
- WG on Loss Measurement C57.123
- WG Sw Transients Ind by TR/Bkr Interaction PC57.142
- WG Guide of FRA for Liquid Filled Transf. C57.149
- WG Short Circuit Withstand PC57.164
- TF PCS Cont. Rev. to Test Code C57.12.90
- TF Audible Sound Revision to Test Code C57.12.90
- TF PCS Cont. Revisions to C57.12.00

Power Transformers SC

- WG Transformer Monitoring C57.143
- WG Control Cabinets PC57.148
- WG Transportation Issues C57.150
- TF Volts per Hertz

Standards SC

- WG Std Terminal Markings C57.12.70
- WG Std Transf. Terminology C57.12.80
- TF PC57.152 Guide for Field Testing
- TF IEEE-IEC Cross Reference

STNP SC

- WG Submersible Transf. C57.12.24
- WG Liquid-immersed Sec. Network TRs C57.12.40
- WG Sec. Network Protectors C57.12.44

NEW WORKING GROUPS/TASK FORCES IN 2019:

- WG Condition Assessment Guide PC57.170
- TF Effects of Corrosion on Transformers

The Transformers Committee revised and approved new Working Group and Entity Working Group Policies and Procedures, which have been submitted to IEEE-SA AudCom for review. Completion of these documents will better position the committee to continue its standards developing activities for the next five years.

The Committee is presently sponsoring two entity WG projects, PC57.12.200, IEEE Guide for Frequency Domain Spectroscopy of Bushings for Transformers and PC57.32.10, Guide for the Selection of Neutral-Grounding Devices for HVDC Converter Transformers.

Paper Submissions for the 2020 T&D Conference:

9 Total Submittals
7 Accepted
2 rejected

Panel Session Submissions for the 2020 T&D Conference:

There was one panel session request submitted related to Transformers Committee activities for the 2020 IEEE PES Transmission and Distribution Conference and Exhibition. The topic is "Discussion of New Dual Nameplate kVA for Distribution Transformers" (see related paper 2020TD0298).

Paper Submissions for the 2020 GM (at the time of this report)**:**

12 Total Submittals (1 Transaction Paper and 11 Conference Papers)
9 Under Review
2 Incomplete

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

Participation in the Committee meetings provides opportunities for networking with industry experts around the world and this collaboration/dialog is key to the globalization of industry standards.

Review of paper submittals helps ensure that papers presented at the various IEEE PES conferences are of high quality and contain valid technical content.

The committee continues its efforts to present high quality tutorials and presentations to assist in the education of its membership and to keep them abreast of continuing developments in the industry. In 2019, four tutorials and one special awards luncheon presentation were provided.

- Spring meeting awards luncheon special presentation – "Wildfire Mitigation, Safety & Grid Resiliency", by Bill Chiu, Southern California Edison
- "Keeping grids resilient – Transformer exchange within a few days & further options to maximize network stability by using state of the art high temperature material and connectivity"
- "Tutorial on IEEE C57.161-2018, The Newly Published Guide for Dielectric Frequency Response Test"
- "CIGRE WG D1.29: Partial Discharges in Transformers"
- "Embedded Optical Sensing Systems for Distribution Transformer Monitoring"

Tutorials presented since 2001 are published on the Transformers Committee website, many of which include both presentation materials and actual recordings of the tutorials. This collection provides a valuable resource for Committee participants and their employers.

New this year are WG, TF, and SC leader training sessions led by the Committee Standards Coordinator. These sessions will be held going forward to keep the group leaders trained on both Roberts Rules and the AMS among other topics.

3. Benefits to Volunteer Participants from the Committee Work:

Tutorials provide Professional Development Hour (PDH) certificates to assist members with professional engineering education requirements.

Participants are able to build a strong network of industry experts, learn through paper review opportunities, and develop presentation, speaking, and negotiation skills through participation and exchange of technical concepts and ideas with others.

4. Recognition of Outstanding Performance:

There was significant recognition of transformer committee members throughout the year, and the Committee had the honor of seeing one of its members, John (Jack) Harley, elevated in the Fellow Class of 2020 for his leadership in safety, performance, and sustainability of power transformers.

The IEEE-SA Medallion was awarded to Edward J. Smith, for sustained leadership and major contributions to the development of transformer standards, including leadership in standardization of new technologies, assuring achievement of standards development goals, identifying opportunities to better serve the needs of standards users or other such contributions viewed as deserving of this award

In 2019, there was one Distinguished Service Award and nine Outstanding Service Awards. The Distinguished Service Award was presented to Peter Balma for long-term leadership, dedication, service, technical and procedural contributions to the Transformers Committee. The Outstanding Service Awards for long-term commitment, dedication, and contributions to the Transformers Committee were presented to Peter Balma, Ramsis Girgis, Rick Marek, Ross McTaggart, Don Platts, Bertrand Poulin, Pierre Riffon, Craig Stiegemeier, and Loren Wagenaar.

The wide-ranging contributions of Transformer Committee members to working group activities throughout the years was recognized with IEEE PES Technical Committee Certificates of Appreciation awards, which were presented to the leaders at the Spring and Fall meetings.

- IEC/IEEE 60214-2 2019 WG Chair Craig Colopy. Tap Changers – Part 2: Application Guidelines. Plaques: Craig Colopy Chair, Axel Kraemer (Vice-Chair), Adam Sewell (Secretary), Certificates of Appreciation: Larry Dix, Marc Foata, David Geibel, Matt Weisensee.
- IEEE Std C57.161-2018 WG Chair Ali Naderian. Guide for Dielectric Frequency Response Test. Plaques: Ali Naderian, Peter Werelius (Vice-Chair), Poorvi Patel (Secretary). Significant Contributors: George Frimpong, Ronald Hernandez, Mark Lachman, Mario Locarno, Thomas Prevost, Diego Robalino, Charles Sweetser
- IEEE Std C57.19.04-2018 WG Chair Scott Digby. Standard Performance Characteristics and Dimensions for High Current Power Transformer Bushings with Rated Continuous Current in Excess of 5000 A in Bus Enclosures. Plaques: Scott Digby, JD Brafa (Vice-Chair), Richard von Gemmigan (Secretary), Certificates of Appreciation: James Campbell, David Geibel, Sebastien Riopel, Eric Weatherbee, Shibao Zhang
- C57.15 WG Chair Craig Colopy. Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators. Published in 2017. Plaques: Craig Colopy, and Gael Kennedy (Vice-Chair), Certificates of Appreciation: Thomas Dauzat, Keith Armstrong, Fredric Friend, James Harlow, Lee Matthews, Daniel Sauer, Richard Kaluzny, Stephen Shull, Murty Yalla, Reginaldo Pimentel, Axel Kraemer

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, SCC18, Doble, NERC/FERC, and EPRI. This effort includes joint sponsorship of standards with IEC, and established liaisons with CIGRE, IEC TC14, ASTM D27, SCC18, and

SCC4 to support significant activity and the exchange of technical information and keeping each other informed of the latest technology advancements.

In addition to the above, the Committee's acceptance of the entity balloting process will further help in producing globally accepted standards.

6. New Technologies of Interest to the Committee:

The major new technologies of interest to the transformers committee continue to be solid state transformer technologies and the continued growth in monitoring systems and their application in relation to the transformer industry.

7. Global Involvement

Total Number of committee members	Officers from regions 8,9	Subcommittee officers from regions 8, 9 and 10	Subcommittee members from regions 8,9, and 10
224	0 Main Committee **and 10**	1 SC 8 WG	46 SC Members

8. Problems and Concerns:

The Committee sees significant work coming up for the integration of solid-state transformers in the industry, impacts due to the penetration of wind and solar transformers, transformer resiliency issues, and challenges to the industry for material availabilities due to uncertain and erratic tariffs, as well as increasing demands for materials used in the transformer industry by other industries.

The volume of standards that the Committee is responsible continues to grow, particularly with Entity initiated standards and guides. Oversite Task Forces for review of Entity projects have been created and Entity WGs have been requested to hold meetings at one of the two yearly Committee meetings.

Maintaining the increasing number of documents becomes more and more difficult with limited time and resources. Finding ways to prioritize and manage the larger volume of potential projects will be key to managing the expanding workload. Many of our participants, particularly the leaders, are active in multiple efforts and continued expansion of the standards under the Committee's responsibility will continue to impact the already challenging task of timely revisions due to stretched resources and limited meeting time slots. One in-progress project by the WG for consolidation of the liquid guides under the Insulating Fluids SC will provide some help by reducing the number of separate guides related to this topic.

Success of growing meetings to 600+ attendees also presents challenges to finding conference venues, as well as how to get new attendees more quickly involved and of help with the workload. The Meeting Planning SC has worked hard to set up several future meeting venues. The following meetings are now firm:

Spring 2020 – Charlotte, North Carolina USA, March 22 – 26, 2020
Fall 2020 – Kansas City, Missouri USA, October 18 – 22, 2020
Spring 2021 – Toronto, Ontario CANADA April 25-29, 2021
Fall 2021 – Milwaukee, Wisconsin USA, October 17-21, 2021
Spring 2022 – Denver, Colorado USA, March 27 – 31, 2022

Use of electronic meetings between the fall and spring Committee meetings is encouraged for the WGs and TFs to better manage their work throughout the year.

9. Significant Plans for the Next Period:

The Committee transitioned its website to the new IEEE PES supported Word Press platform in 2019. This will allow more than one person to help with keeping the site updated.

The Committee continues to evaluate the possible expansion of the RFID technology used for meeting attendance and quorum determination during meetings. Possible expansion of its capabilities with ties into the 123Signup AMS may be worthwhile, however, a cost to benefit analysis is still needed.

Submitted by: Susan McNelly **Date: 1/14/2020**