

2017

**Entity:** Switchgear Committee

**Chair:** Paul B. Sullivan

**Vice-Chair:** Todd Irwin

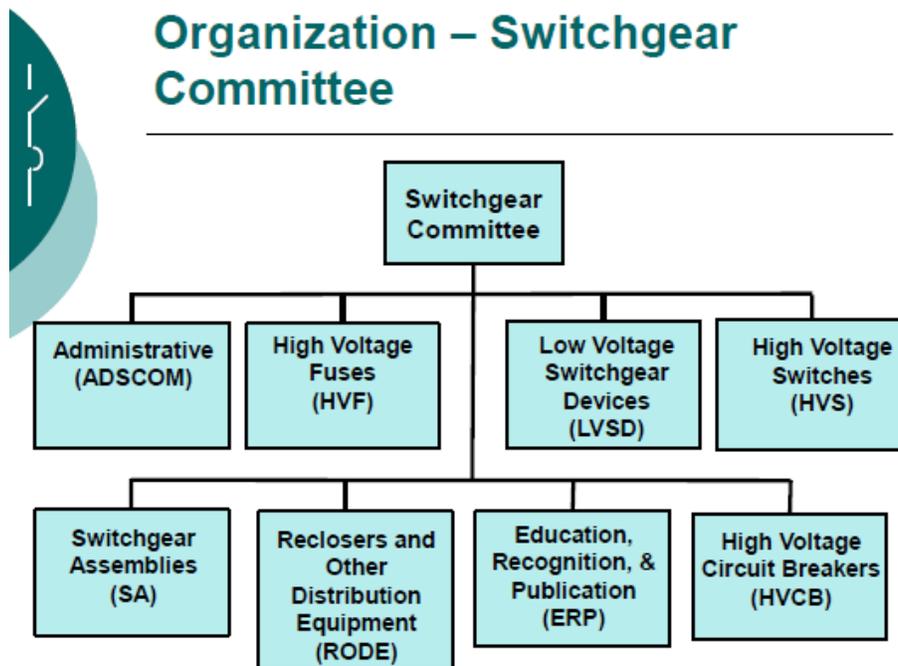
**Secretary:** Keith Flowers

**Immediate Past Chair:** Ted Olsen

**1. Significant Accomplishments:**

Organization

The Switchgear Committee six technical subcommittees (HV Circuit Breakers, HV Fuses, HV Switches, LV Switchgear Devices, RODE [Reclosers and Other Distribution Equipment], and Switchgear Assemblies) have approximately 30 active working groups or task forces preliminary to formation of working group. The Switchgear Committee sponsors approximately 60 standards and have approximately nine new standards in development. The list of active working groups fluctuates, with working groups disbanded as their projects are completed, and with new working groups forming on a continuing basis. The figure below shows the six technical subcommittee plus the Switchgear Committee Administrative Subcommittee (ADSCOM) and Education, Recognition, and Publication Subcommittee (ERP).



At the end of 2017, Committee officers rotated according to normal practice. Selection of a new Secretary/Treasurer is complete.

### Standards Activities

An active plan is in place to revise any and all relevant standards that are due for administrative withdrawal at the end of 2018, to comply with the changes enacted by IEEE-SA in 2008 that ended reaffirmations and imposed a requirement to revise or withdraw standards that were not revised within ten years of approval. While some work remains, all of the documents due to expire at the end of 2018 will be revised before they expire.

The Switchgear Committee actively works to harmonize requirements in various standards with the requirements of the relevant IEC standards. At present, requirements for HV circuit breakers are fundamentally harmonized although not interchangeable with IEC. Requirements for other portions of the Switchgear Committee standards are harmonized with IEC to varying degrees, determined primarily by differences in the user practices between the IEC and ANSI/IEEE markets.

The Switchgear Committee P&P for standards development were accepted by IEEE-SA in December, 2012. The Working Group P&P were created using the PES Technical Council template in September, 2013, and found to be without issue by AudCom and the IEEE-SA Standards Board in December, 2013. The operating procedures for the committee were approved by the committee at its April 2015 meeting and were approved by the PES Technical Council in August, 2015.

The Switchgear Committee P&P was updated in the Fall of 2017 and sent to AUDCOM for review/approval. Ted Olsen (Immediate Past Chair) is leading that work for the Committee.

In 2017, ten standards, guides, or recommended practices updated or created by the Switchgear Committee, or co-sponsored by the Switchgear Committee were approved by the Standards Board. The approved documents and the subcommittee responsible for the document revisions are shown below.

#### High Voltage Circuit Breakers Subcommittee

- 62271-37-013-2015/Cor 1 – IEEE/IEC International Standard for High-Voltage Switchgear and Controlgear – Part 37-013: Alternating Current Generator Circuit Breakers – Corrigendum 1

#### High Voltage Fuses Subcommittee

- C37.14-2016 Cor. 1 – IEEE Standard Design Tests for High-Voltage (>1000 V) Fuses and Accessories

#### High Voltage Switches Subcommittee

- C37.30.1a – IEEE Standard Requirements for AC High-Voltage Air Switches Rated Above 1000V – Amendment 1

#### Switchgear Assemblies Subcommittee

- C37.20.7 – IEEE Guide for Testing Switchgear Rated Up to 52kV for Internal Arcing Faults
- C37.21 – IEEE Standard for Control Switchboards
- C37.24 – IEEE Guide for Evaluating the Effect of Solar Radiation on Outdoor Metal-Enclosed Switchgear



- C37.81 – IEEE Guide for Seismic Qualification of Class iE Metal-Enclosed Power Switchgear Assemblies
- C38.82 – IEE Standard for the Qualification of Switchgear Assemblies for Class 1E Applications in Nuclear Power Generating Stations

We expect a comparable level of published standards documents in 2018. In early January 2018, the Committee had 25 active standards working groups.

The publication of C37.20.7 was a major accomplishment. The Guide was expanded to include internal arcing fault tests for low-voltage motor control centers, switchboards, medium-voltage ac controllers, metal-enclosed bus, metal-enclosed medium-voltage outdoor circuit breakers, and gas-insulated switchgear. This Guide has a direct impact on the safety of personnel who interact with the equipment included in the Guide.

Some of our members are significant contributors to the IEEE Standards Association governance process. Ted Burse and Doug Edwards were members of the 2017 Standards Board. Doug Edwards was a member of AUDCOM and REVCOM. Ted Burse was a member of NESCOM and the Chair of PROCOM.

Financial

The Switchgear Committee plans and executes their own meetings with support from IEEE MEC team for hotel contract negotiation. Revenue comes from registration fees charges attendees and from support from corporations. Expenses are those related to meetings (catering, audio/visual, social events, and similar.)

The Switchgear Committee is in sound financial condition. This is a significant improvement over the Committee financial condition less than 10 years ago. The Treasurer provides monthly reports to Committee officers to report on the health of the Committee. Discrepancies in any account are quickly identified and resolved. The Committee has enough financial reserves to handle varying meeting commitments.

Meetings

The Switchgear Committee holds two meetings each year, one in the Spring and one in the Fall. Attendance at these meetings is on an upward trend, rising from around 110 participants in 2003 to approximately 250 people at recent meetings. The Switchgear Committee has an over 4% annual increase in meeting attendance since the Committee started tracking attendance in 2004.

The Switchgear Committee meets outside the JCTM and PES General Meeting and therefore plans their own meetings. Contracts have been signed for the next seven, as shown below:

Spring 2018	April 22-26, 2018	Disney’s Contemporary Resort Lake Buena Vista, FL
Fall 2018	October 13-18, 2018	Kansas City Marriott Kansas City MO
Spring 2019	April 28-May 3, 2019	Hilton Burlington

		Burlington, VT
Fall 2019	October 6-10, 2019	Catamaran Resort Hotel San Diego, CA
Spring 2020	May 4-7, 2020	Peppermill Resort Reno LV
Fall 2020	October 3-8, 2020	Sheraton Fort Worth Fort Worth TX
Spring 2021	April 19-22, 2021	Hilton Charlotte University Charlotte NC

The Switchgear Committee meeting planning process now uses resources from the IEEE Meetings, Conferences, and Events (MCE) organization. MCE personnel assist with the following:

- Development of meeting specification as basic for request for proposal (RFP).
- Distribute RFQ to meeting facility/hotel properties where the Switchgear Committee wants to hold a meeting.
- Performing an initial review of all received proposals.
- Assisting with final contract negotiations with the chosen meeting facility/hotel property.
- Coordinating IEEE Legal of all Switchgear Committee contracts for meeting venues or other activities (such as social events held outside of the meeting venues.)

Using the IEEE MCE group has been a significant benefit to the Switchgear Committee in the following ways.

- Reduces work load of the Switchgear Committee Vice-Chair who is responsible for all meeting related contracts.
- Ensures the proper legal reviews of all contracts the Switchgear Committee may enter.
- Help leverage IEEE buying power by knowing meeting venues where IEEE has a competitive advantage.

The Switchgear Committee highly recommends other PES Technical Council Committees consider using IEEE MCE in their event planning process.

### Website

The Switchgear Committee website continues to be updated to a more interesting format and continues to include access to minutes of past meetings (from 1990 to date), and many technical presentations. A template was created that the Switchgear Committee Subcommittees use to submit updated information to the webmaster to use to update the Subcommittee website. The template has provided a much easier and standardized method for Subcommittee to submit updates.

### Central Desktop

Switchgear Committee officers uses Central Desktop to store important Committee related documents including items such as meeting contracts, meeting planning information, and Committee procedures. Using Central Desktop to store this information ensures each officer has access to the documents that officer may need. This reduces the need to contact other officers and request specific information.



Power & Energy Society®

The officers have found that using Central Desktop is an excellent tool and highly recommends other Technical Council Committees also considering using it. Our Standards Association contact (Erin Spiewak) can create an account for any committee that needs one.

### Subcommittee Work

Each of the Switchgear Committee Subcommittees performs a significant amount of work to ensure their standards are revised at the proper frequency and to contribute to other activities. Below are some examples of some specific Subcommittee activities that we wish to highlight.

- HVCB – They created a task force to study shunt reactor (inductive load) switching. The results of that task force will be used to help improve HVCB standards.
- ADSCOM – Nenad Uzelac lead an effort to create a new Switchgear Subcommittee for Technology and Innovation. That Subcommittee will be included in the Switchgear Committee Operating Manual and will have their initial meeting at the Spring 2018 Committee meeting.
- RODE – Created a joint task force with the IEEE Substation Committee to investigate the state of the art of alternative gases used for insulation in switchgear. A 120 page technical report was created and presented to the committee members. The report is also being published in IEEE Xplore.
- RODE – Created a new task force on recloser control cables. The information from the task force will be include in future revisions of RODE sponsored standards.

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

The Switchgear Committee creates and maintains standards that benefit the stakeholders in many ways, including these:

- Users, producers, testing firms, and third-party certification bodies benefit by having performance requirements that are consistent and that give confidence that products carrying equal ratings exhibit equal performance.
- Users and producers benefit by having known performance-oriented requirements rather than rote construction mandated (but not necessarily performance-oriented) requirements. This allows producers to introduce new technologies that produce equal performance without conflicting with arbitrary standards-mandated construction requirements.
- Users, producers, testing firms, and third-party certification bodies benefit from having relatively stable standards for products, as revisions of standards are generally made except at intervals of seven to ten years.
- Users, producers, testing firms, and third-party certification bodies benefit from the creation of new standards covering areas previously not addressed in standards, such as testing of equipment under conditions of internal arcing faults, special interrupting applications such as transformer-limited faults, and conversions of existing equipment to accommodate newer technologies. The guide for internal arcing tests is particularly significant as the document (C37.20.7) has been expanded over the years to cover significantly more equipment varieties, providing a consistent set of testing requirements over a range of product types.

### **3. Benefits to Volunteer Participants from the Committee Work:**

- Participation in standards activities provides a solid basis for education of new participants, while providing a forum to capture the knowledge of experienced participants.
- The Switchgear Committee has participation by a significant number of persons who have formally retired from the business world, yet continue to participate, in several cases without financial support from their former employer or some other firm. It is reasonable to surmise that such individuals would not do so except that participation provides them some measure of satisfaction.
- Participants in the standards process benefit from recognition within their employer organizations as “experts” in their technical field, and particularly if they participate in some officer capacity in working groups or in the committee structure.
- The Switchgear Committee provides recognition to working group members and committee officers, typically with a plaque. When standards are published, the participants are also recognized in the front matter of the document.
- Tutorials are provided at each Switchgear Committee meeting. This provides meeting participants to get free training on current topics. Switchgear Committee members who are experts in their field typically provide the training.
- The Switchgear Committee recommends that the promotion of such benefits to potential participants, particularly users who struggle to secure management support for Committee activities, both financial and time. The Switchgear Committee has taken action to support participants with a simple one-page “brochure” detailing the virtues of Committee participation as well as a justification letter template that may be used by participants.

### **4. Recognition of Outstanding Performance:**

Education, Recognition, and Publication (ERP) Subcommittee oversees all the activities related to nominations, recognitions, awards, prizes, and certificates of appreciation for exceptional individuals and groups. Annually ERP considers nominations for the following awards:

- PES Prize Paper award
- PES Outstanding WG award
- PES Award for outstanding Standard or Guide
- TC award for prize paper
- TC award for outstanding service to the Committee
- TC award for outstanding Working Group.

The Working Group for IEEE Std C37.14 received the PES Technical Committee Working Group award.

In 2017 we elevated 14 new people to members of the Switchgear Committee. This was in recognition of the contributions from each individual along with recommendations from Subcommittee Chairs. We also elevated three people to Honorary Member.

In addition all outgoing officers, including subcommittee chairs, are presented with certificates of appreciation.

ERP stimulates and encourages nominations for Senior Membership of IEEE and IEEE Fellows. A recent push to encourage Committee members to become Senior Members has resulted in numerous people



receiving that accomplishment. Nineteen Switchgear Committee people were elevated to Senior Member in 2017. Senior Members are recognized through special ribbons on name badges worn during the Committee face to face meetings. ERP continues to work to nominate appropriate Switchgear Committee attendees for IEEE Fellow.

In addition, ERP oversees the paper review process for all papers that relate to Switchgear Committee technical areas, whether for conferences such as the IEEE PES T&D, the PES General Meeting, for Transactions, or other publications.

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

Switchgear Committee keeps a close liaison with CIGRE Study Committee A3 (High Voltage Equipment). Nenad Uzelac is an official US Representative to CIGRE SC A3 as well as the liaison between IEEE Switchgear Committee and CIGRE A3.

A number of projects and standards are in process or published that are joint efforts with other IEEE PES sponsors or with the IEC. Among these are:

- IEC 62271-111 / IEEE C37.60, dual logo IEEE/IEC, High voltage switchgear and controlgear – Part 111: Overhead, pad-mounted, dry vault, and submersible automatic circuit reclosers and fault interrupters for alternating current systems up to 38 kV. (revision in process)
- PC37.20.9, Metal Enclosed Switchgear Rated 1kV to 52 kV Incorporating Gas Insulation Systems, co-sponsored by IEEE PES Substations Committee (project in process)
- C37.122, High Voltage Gas-Insulated Substations Rated Above 52kV, sponsored by IEEE PES Substations Committee, co-sponsored by IEEE PES Switchgear Committee.
- IEC 62271-37-082, dual logo, IEEE/IEC, High-voltage switchgear and controlgear - Part 37-082: Measurement of sound pressure levels on alternating current circuit-breakers.
- IEEE C37.301, Partial Discharge Measurements. A working group has been formed and PAR will be submitted for review and update of this document. Members from HVTT participated in the first WG meeting and have been invited to take an active role in the WG.

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

The committee has several projects or task forces involved in new technologies:

- David Peelo, HVCB Subcommittee member, presented a tutorial titled *Shunt Reactor Switching; Theory and Practice* at the IEEE PES T&D Conference. That tutorial was sponsored by the Switchgear Committee.
- The solid dielectric task force (SDTF) is exploring materials, application and environmental conditions, and tests for new insulation systems in which insulation is molded as an integral element of an assembly that includes the interrupting or switching device, e.g., such as for an outdoor distribution recloser. The task force anticipates issuing their final report in the near future.
- Task force for controls for distribution equipment is developing a technical report with recommendations for microprocessor-based controls for equipment over 1000 Vac up to 38 kVac for overhead and underground distribution lines, including test and application information. Such controls typically would include the protection associated with the switching device, as well as the

controls devices (open, close, etc.) with communications capability. The control device would serve in place of traditional relays and control devices that are appropriate for high voltage circuit breakers but not suitable for distribution equipment mounted on power poles or below grade. Completion of the report is anticipated in the Spring of 2016.

- Due to increasing interest in SF6-free solutions for high voltage switchgear as well as promising developments in available technology, the Committee has formed a TF on Alternative Gasses. The objective of the task force is to create a written report (white paper format) and present back to SG ADSCOM in 2017. The scope of work of task force is limited to: Literature Review (last two years), Outline aspects for consideration (technical, environmental, safety...), review of IEC, CIGRE, Current Zero club activities on alternative gasses, review IEEE standards – are they transferable to non-SF6 and recommendation for the next steps.
- A study group has been formed to review potential need for a technology and innovation subcommittee. The stated goal is to review way to address the Switchgear Committee activities, Organize Technical Sessions, Prepare and Review Technical Papers and Further the Art of power engineering. The study group reported to ADSCOM and believes the formation of the new Subcommittee would benefit the Committee. The Switchgear Committee Operating and Procedures manual will be updated with the scope of this new subcommittee and submitted to the PES Technical Council for review/approval.

#### **7. Significant Plans for the Next Period:**

The Committee has the following significant plans for 2018.

- Continue to maintain financial stability of the Committee.
- Continue to plan and hold two face to face Committee each year at locations that attract meeting participation.
- Update the Committee P&P for standards development when the revised P&P template is available. The current Committee P&P was approved in December 2012 and is required to be updated at least every 5 years. The Committee will submit an update P&P once the PES Technical Council issues a new P&P new template and the Committee can enter appropriate Committee information. Ted Olsen, Switchgear Committee Immediate Past Chair, has contributed significantly to the development of a revised P&P.
- Continue to monitor standards scheduled for withdrawal in 2018 to assure that ongoing projects are completed before withdrawal. Currently all Committee sponsored standards are on track for revision before the end of 2018.
- Work with selected subcommittees having a heavy workload of standards to be revised to assure that the workload can be handled within the available resources and time. This requires that projects need to be completed within the four-year validity of a PAR.
- Continue work to further market Committee meeting participation in the standards development process. Committee growth has averaged over 5% annual increase for over 10 years with attendance of approximately 250 people at recent meetings.

#### **8. Global Involvement**

PES is looking to increase involvement with members from Regions 8, 9 and 10 (Africa, Europe, Middle East, Latin America, Asia and Pacific). Please provide the following information.

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
70	0	0	0

## 9. Problems and Concerns:

The largest concern of the Switchgear Committee is recent problems when updated IEEE Std C37.100.1. The project to revise IEEE C37.100.1 had been underway since 2011 reached the point of final submission to RevCom in 2017. At that time, there was a significant problem with getting copyright permission from IEC. Much of the IEEE C37.100.1 document was the exact text from the corresponding IEC document. Initial indication to the working group was this duplication would not be a problem for IEC.

One of the objectives of the project as stated in the original PAR was to “further harmonization between the IEEE and the IEC standards”. Harmonization means developing uniform requirements for global application for the benefit of all stake-holders, the equipment manufacturers, users, and the laboratories that test and certify the equipment.

Harmonization is a process that often includes negotiation and acceptance by the stake-holders. In the case of IEEE C37.100.1 the process began as far back as the year 2000 resulting in the first edition published in 2007. This first edition adopted a stance of gathering the “low hanging fruit” in that the structure, nomenclature and non-controversial elements of IEC 62271-1:2007 were brought into the document. Copyright approval for this borrowed material was granted by the IEC without question even though the amount of content may have exceeded the unwritten 10% rule.

Unaware (and perhaps naive) of the 10% content rule, the working group for the second edition of C37.100.1 proceeded to further the harmonization process. This time copyright permission was refused, the project came to a halt and the future of IEEE C37.100.1 is in jeopardy.

This experience has brought to light the fact that efforts by the members of IEEE and IEC to develop consistent (harmonized) standards may conflict with the business objectives of the respective organizations.

The Switchgear Committee has no other significant pressing issues and concerns but lists the following two items for awareness.

- The major issue of the mandated expiration of standards at the end of 2018 seems to be well under control, as plans and projects are in place to address each standard before 2018.
- Relations with IEEE-SA, in sad condition some years ago, are now EXCELLENT, and IEEE-SA staff personnel have been extremely helpful to the Switchgear Committee.

**Submitted by: Paul B. Sullivan, Chair IEEE PES Switchgear Committee**

**Date: March 8, 2018**