

IEEE Power and Energy Society Entity Annual Report

2019

Entity:	Substations Committee
Website:	https://cmte.ieee.org/pes-substations
Chair:	Joseph Gravelle
Vice-Chair:	Patrick Fitzgerald
Secretary:	Joe Warner
Immediate Past Chair:	Diane Watkins

a) Significant Accomplishments:

a. Standards – Substations Committee currently manages 44 standards, of these, 22 were in active development in 2019, with the following deliverables:

i. Publishing:

1. P1267 – Guide for Development of Specification for Turnkey Substation Projects
2. C37.20.9-2019 – IEEE Standard for Metal-Enclosed Switchgear Rated 1kV to 52kV Incorporating Gas Insulating Systems

ii. Balloting/recirculation:

1. P1427 – Guide for Recommended Electrical Clearances and Insulation Levels in Air Insulated Electrical Power Substations
2. P1246 – Guide for Temporary Protective Grounding Systems used in Substations
3. P1402 – Guide for Physical Security of Electric Power Substations

iii. New PAR approval:

1. P1264 – Guide for Animal Deterrents for Electric Power Supply Substations
2. P1623 – Guide for Functional Specification of Medium Voltage (1 kV - 35 kV) Electronic Shunt Devices for Dynamic Voltage Compensation
3. PC37.122.2 – Guide for Application of Gas-Insulated Substations 1 kV to 52 kV
4. PC37.122.3 – Guide for Sulphur Hexafluoride (SF6) Gas Handling for High-Voltage (over 1000 Vac) Equipment
5. PC37.017 – Standard for Bushings for High-Voltage [over 1000 V (ac)] Circuit Breakers and Gas-Insulated Switchgear
6. PC37.122.9 - Guide for Condition Assessment of Gas-Insulated Substations

7. P2829 - Guide for Handling Non-SF6 Gas Mixtures for High Voltage Equipment

b. Tutorials and Panels Summary

i. Annual Meeting San Francisco, CA

1. IEEE STD 980 Guide for Oil Containment Systems
2. IO Gave a tutorial on Transmission Shunt Compensation
3. D2 Gave a tutorial on Design and Installation of Cable Systems in Substations

ii. GM 2019 Atlanta, GA

1. 4 papers hosted in the Poster Session
 - a. Start-up Issues and strategies of MMC-based Multiport Solid State Transformer
 - b. Model predictive control of single-phase Grid-Connected Voltage Sourced Converters
 - c. Grid-Forming Droop Control of a Modular Multilevel Converter in Laboratory
 - d. A Multilevel dual converter fed Open end Transformer Configuration for Hybrid AC-DC Microgrid

c. Other Committee and Subcommittee Activities

- i. The Annual Meeting of the Substations Committee was held in San Francisco, CA and hosted by PG&E. The administrative subcommittee (B0) also met at the PES General Meeting in Atlanta, GA in August.
- ii. Other Subcommittee meetings were held at the JTCM in Anaheim, CA in January, and the General Meeting in August.

b) Benefits to Industry and PES Members from the Committee Work:

The most notable activity of the Substations Committee is the revision and updating of standards and guides and initiating work on new standards. These standards are widely utilized and provide the most direct benefit to the industry

The Substations Committee also started a program to help support young professionals and experienced contributors by starting an assistance program that will allow members from these groups to get financial assistance for meeting registration and hotel accommodations to attend working group meetings.

c) Benefits to Volunteer Participants from the Committee Work:

Participants have benefited from their collaboration on technical problems with industry leaders and experts, discussing contemporary industry problems and concerns, and the satisfaction of creating standards and guides that are useful to the industry. Committee meetings have included presentations of experts in specific fields and debating of ideas and industry practices, including CIGRE member input. Substations Committee members have also benefited from their exposure to technical paper reviews and technical paper presentations.



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Active participants also have opportunities to take on leadership roles and improving their leadership skills as well as mentoring skills working with teams with a variety of experience in technical and organizational activities.

Substations are considered strategic assets, and many components are now reaching the end of their original design life. Valuable information is exchanged on modern design approaches and explaining new technology, as well as the issues specific to new technology and suggested improvements for the electric power industry market; for example, Voltage-Source Converters (VSC) and alternative gases for insulation.

d) Recognition of Outstanding Performance:

- a. IEEE PES Technical Committee Working Group Recognition Award: Guide for the Design and Installation of Cable Systems in Substations; Co-chairs Hanna Abdallah & Joseph Gravelle
- b. IEEE PES Technical Committee Working Group Chair Award George Becker, Past chair of K0

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

- a. IEC – IEEE liaison Herman Koch presented status reports for the following IEC activities:
 - i. TC 17 MT3 – IEC 62271-4, Use and Handling of SF6
Maintenance of the guide and edit language to allow for alternative gases, with publication expected 2021-10. Liason with K4 to be established.
 - ii. TC 17 WG05 – IEC 62271-5 DC Gas Insulated Systems General Requirements
New working group for DC GIS switchgear above 1.5 kV, with publication expected 2022-04. To be monitored by K0.
 - iii. SC 17A DC Switchgear Devices Standards,
Four new Technical Specifications, with publication expected 2022-05, are started for DC gas insulated switchgear devices. To be monitored by K0.
 1. IEC TS 62271-312 DC Circuit Breaker
 2. IEC TS 62271-313 DC Disconnect and Earthing Switches
 3. IEC TS 62271-314 DC Transfer Switches
 4. IEC TS 62271-315 DC By-pass Switches
 - iv. SC 17C DC Switchgear Assemblies Standards
New Technical Specifications is started for DC gas insulated switchgear Assemblies (DC GIS), IEC TS 62271-316 DC Gas Insulated Switchgear Assemblies (DC GIS), with publication expected 2022-05. To be monitored by K0.
 - v. SC 17C HV AC Gas Insulated Switchgear Assemblies (GIS)
Revision of this IEC International Standard has started for AC gas insulated switchgear Assemblies (AC GIS), IEC 62271-203 HV AC Gas Insulated Switchgear Assemblies (GIS), with publication expected 2021-10. Liason with K1 Chair is established.
 - vi. SC 17C HV and MV Seismic Requirement of GIS
Revision of this IEC International Standard will be started for AC gas insulated

switchgear assemblies (AC GIS) for high and medium voltage, with publication expected 2022-12. The revision work is focused on merging of 62271-207 with 62271-210 into one document and to adapt to the latest version of IEEE 693. Liason with E0 would be beneficial.

1. IEC 62271-207 HV AC Gas Insulated Switchgear Assemblies (GIS)
 2. IEC 62271-210 MV AC Gas Insulated Switchgear Assemblies (GIS)
- vii. SC 17C HV/MV Mobile Substations
This new IEC International Standard is planned to start for AC air and gas insulated switchgear (AIS) and switchgear assemblies /GIS) for high and medium voltages, with publication expected 2022-10. This new International Standard will give requirements for the safe installation, testing and operation of mobile substations using AIS and/or GIS equipment with HV and/or MV. To setup liason with K0 Chair
- viii. TC 99 Insulation Coordination & System Engineering
WG 13 IEC 60071-3 Insulation Coordination for HVDC Systems, with publication expected 2022-05, progress to be monitored by E0/D0/G0
- ix. MT 4 IEC 61936-1 Power Installation >1kV AC, with publication expected 2020-12, progress to be monitored by E0/D0/G0
- x. JMT 7 IEC 61936-2 Power Installation >1kV DC, with publication expected 2020-08, progress to be monitored by E0/D0/G0
- xi. TC 115 HV DC Transmission above 100 kV
New standardization work to be monitored by I0
1. WG 2 Reliability and availability evaluation of HVDC system
 2. WG 3 Electromagnetic Environment Criterion for High-voltage Direct Current (HVDC) Overhead Transmission Lines
 3. WG 4 Guidelines on Asset Management of HVDC Installations (former PT1)
 4. WG 5 System design of HVDC project
 5. WG 6 Guideline for HVDC system operation procedures
 6. WG 7 DC side harmonics & filtering in LCC HVDC transmission systems
 7. WG 9 High-Voltage Direct Current (HVDC) Power Transmission - System requirements for DC-side equipment
 8. WG 10 Guideline for planning of HVDC systems - Part 1: HVDC systems with line commutated converters
 9. WG 12 Life extension of HVDC converter stations
- Existing standardization work to be monitored by I0
10. MT 8 Maintenance work for IEC/TS 62344

11. JWG 11 Performance of voltage source converter based high-voltage direct current transmission linked to SC 22F
 12. JWG 22 Atmospheric and altitude correction Managed by TC 42
- xii. TC 122 UHV AC Transmission Systems above 800 kV with progress monitored by Substations
- Existing standards:
1. IEC TR 63042-100: 2016 UHV AC transmission systems – Part 100: General Information
 2. IEC TS 63042-101: 2019 UHV AC transmission systems – Part 101: Voltage regulation and insulation design
 3. IEC TS 63042-201: 2018 UHV AC transmission systems – Part 201: UHV AC substation design
 4. IEC TS 63042-201: 2018 UHV AC transmission systems – Part 301: On-site acceptance tests
 5. New Standards:
 6. WG 01 IEC TS 63042-102 UHV AC transmission systems – Part 102: General system design
 7. WG 02 IEC TS 63042-202 UHV AC transmission systems – Part 201: Transmission line design
 8. WG 03 IEC TS 63042-302 UHV AC transmission systems – Part 301: System commissioning
- b. CIGRE – US national committee supports Grid of the Future, Atlanta, GA November 3-6, 2019.
- c. T&D – Joint work on 1613.1, liaison with I0
- d. ESSB – Substations Committee D9 WG has been coordinating with Energy Storage and Stationary Battery Committee in their efforts for balloting 946.
- e. Switchgear Committee Joint Work:
- i. Joint Standards C37.20.9 Standard for Metal-Enclosed Switchgear Rated 1 kV to 52 kV Incorporating Gas Insulating Systems – George Becker WG Vice Chair and Liaison from K0 – Published
 - ii. Joint Standard C37.122 Standard for High Voltage Gas-Insulated Substations Rated Above 52 kV – Ryan Stone is Chair and Liaison from K0 – Revision started
 - iii. Joint Standard on Alternative Gases – George Becker, Arnaud Ficheux, and Peter Grossman liaison from K0 – new guide started
 - iv. Joint Standard for Bushings for High-Voltage [over 1000 V (ac)] Circuit Breakers and Gas-Insulated Switchgear – Devki Sharma is Chair



f. NESC – Bruce Dietzman represented the Substations Committee at the NESC - Subcommittee 3 – Electric Supply Stations meeting

i. David Guzman will replace Bruce as NESC liaison in the future. The Substations Committee thanks Bruce for his years of support!

ii. Work on the 2022 NEC has begun, with publication expected August 2021.

f) New Technologies of Interest to the Committee:

a. HEMP – High-altitude electromagnetic pulse, and IEMI- Intentional Electromagnetic Interference

b. Voltage Source Converters (VSC) for FACTS and HVDC

c. Alternative Gases for SF6 for Gas Insulated Substations

g) 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
419	0	2	17

h) Significant Plans for the Next Period:

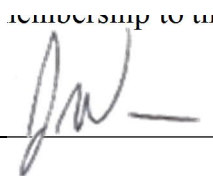
The substations Committee leadership will be focused on leader succession plans, Entity standards support, and supporting other PES committees as requested with use of 123.

Our working groups continue to update several standards documents.

We will be updating our committee website when the new PES WordPress template is posted Jan 2020.

We are also interested in increasing membership to the substations committee.

Submitted by: Joe Warner

membership to us


Date: 12-31-2019