Power Transformers Subcommittee

October 30, 2024

St. Louis, Missouri, USA

Meeting Time: 1:30-2:45 p.m.

Chair: Ryan Musgrove  
Vice Chair: Alwyn VanderWalt  
Secretary: Weijun Li

# Meeting Attendance

The Power Transformers Subcommittee (PTSC) met on Wednesday, October 30 at 1:30 p.m. The attendance record indicates that 87 out of 109 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 247 individuals attended the meeting. PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric), Vice Chair Alwyn VanderWalt (Electrical Consultants, Inc.), and Secretary Weijun Li (Braintree Electric Light Department) were present.

Nine individuals requested membership by speaking with or emailing PTSC officers after the meeting. Eight attended at least 3 out of the last 5 meetings and therefore qualified for “Member” status. The 9th has not been recorded in attendance in 3 out of the last 5 meetings, and therefore not yet qualified for membership.

A total of 55 individuals were added as “Guests” to the subcommittee. Ten individuals updated their contact information. Two individuals have been moved from “Member” to “Guest” for not having recorded attendance at the last 3 out of 5 meetings.

With the membership changes stated above, PTSC has a total of 115 members after the Fall 2024 meeting.

The complete attendance record is provided in Attachment K.1.

# Approval of Agenda and Meeting Minutes

The Chair presented the meeting agenda and mentioned that a typo was corrected in the previously circulated Spring 2024 meeting minutes. Stephen Shull (BBC Electrical Services, Inc.) made a motion to approve the agenda as presented, which was seconded by Juan Carlos Cruz-Valdes (Prolec GE). The agenda was approved without objection. The approved agenda can be found in Attachment K.2. Sanjib Som (Pennsylvania Transformer) made a motion to approve the Spring 2024 meeting minutes with correction, which was seconded by Stephen Shull (BBC Electrical Services, Inc.). The Spring 2024 meeting minutes were approved without objection.

# Chair’s Remarks

The Chair provided an update on the PTSC roster. One member had been moved to Guest status due to not having attended at least 3 out of the last 5 meetings. Attendees were reminded to verify their email address and update as necessary. Using IEEE alias as contact email is highly recommended. The Chair also announced that guests who wish to become a member of the Power Transformers Subcommittee should see subcommittee officers after the meeting or contact one of the officers by email requesting membership. Membership requests on paper roster will not be accepted.

The Chair provided an overview of the future scheduled meetings and proposed locations.

The Chair provided an overview of the working group and task force requirements for the scheduling of meetings, submission of minutes, and other administrative tasks. The Chair suggested that short meetings be held virtually so they won’t take up in-person meeting slots.

The Chair provided an update on the new system tracking attendance and reminded the membership to create their account in the new committee management system Memberplanet if they haven’t already done so. Paper roster will continue to be used until the new system is ready and data migration is complete.

The Chair reminded the working groups of patent calls and copyright & participant behavior review at each meeting and note in the minutes.

The Chair asked the audience to use a microphone and state their name and affiliation when speaking. The Chair also reminded the group not to interrupt an ongoing motion with a technicality that a motion or second may not be required.

The Chair shared a note from AdCom suggesting that a WG form a comment resolution group to handle comments from the ballot when moving a draft to ballot.

The Chair announced that Malia Zaman is transitioning away from the Transformers Committee. Patrycja Jarosz will be the IEEE staff point of contact for PTSC going forward.

The Chair showed a summary slide and provided an overview of the documents that PTSC is responsible for developing and maintaining.

The Chair introduced 3 new members that were added to the PTSC membership list since the Spring 2024 meeting. The new members are listed below:

Jose Machain (Prolec GE)

Ed teNyenhuis (Hitachi Energy)

Dharam Vir (Prolec GE)

The Chair provided the requirements for establishing & maintaining membership and urged members to participate in all email ballot requests. When a voting member is absent for more than two consecutive scheduled regular meetings and fails to participate by correspondence, the member may be removed.

# Working Group and Task Force Reports

## Revision of C57.131, Standard Requirements for Tap Changers – Craig Colopy

This group didn’t meet in St. Louis. The final draft (D1.3) was approved as a revised standard by IEEE SA Standards Board Standards Review Committee (RevCom) on February 15, 2024.

## WG C57.156, Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors – Peter Zhao

This working group met on Monday. A quorum was achieved. WG Chair Peter Zhao (BC Hydro) reported that Marc Foata (Maschinenfabrik Reinhausen) gave a presentation on rupture proof OLTC solutions. The group reviewed the proposed modifications to sections 4.2.2 & 4.2.3 that were prepared by a task force formed by Samuel Brodeur (Hitachi Energy) and Enrique Betancourt (Prolec GE). The group also reviewed some of the proposed modifications to Section 5.2 that were prepared by another task force formed by Marc Foata (Maschinenfabrik Reinhausen), Chris Johnson (Oncor), Ryan Musgrove (Oklahoma Gas & Electric), Samson Debass (EPRI), and Didier Hamoir (Transformer Protector Corp). Discussion of these technical topics will continue at the next meeting.

The complete meeting minutes can be found in Attachment K.4.2. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## Revision of C57.116, Guide for Transformers Directly Connected to Generators – Weijun Li

This working group completed its work in 2022; therefore, they won’t meet again until the next revision cycle, possibly 2027.

## WG IEEE 638, Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations – Craig Swinderman

This working group met on Monday with 6 members and 27 guests present. 2 guests requested membership. WG Chair Craig Swinderman (Mitsubishi Electric Power Products) said that the PAR was approved on December 6, 2023 with an expiration date of December 31, 2027. The group reviewed Draft 2 of the document. The WG Chair indicated that further updating of IEEE 638 will be based on changes to another standard IEEE/IEC 60980-344-2020. The group will also review Annex A for update.

The complete meeting minutes can be found in Attachment K.4.4. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## WG C57.135, Guide for the Application, Specification, and Testing of Phase-Shifting Transformers – Ewald Schweiger

This working group met on Monday with 48 attendees and achieved a quorum. WG Chair Ewald Schweiger (Siemens Energy) provided an update on document review since the Vancouver meeting. Kevin Juchem (Hitachi Energy) and Luc Dorpmanns (Royal SMIT Transformers) presented ideas about harmonization and redistribution of contents in Guide C57.135 and Standard 60076-57-1202. The group recognized that this is a unique opportunity to harmonize, clean up, and enhance the contents of three relevant documents simultaneously: C57.135 (60076-57-135) Guide for the Application, Specification, and Testing of Phase-Shifting Transformers, IEEE/IEC 60076-57-1202 International Standard Power Transformers, Part 57-1202: Liquid-immersed Phase-Shifting Transformers, and C37.245 IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers.

This working group is looking for volunteers to review the existing document for improvements and help with editorial changes.

The complete meeting minutes can be found in Attachment K.4.5. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## Revision of C57.143, Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Components – Mike Spurlock

This group didn’t meet in St. Louis due to the new draft guide being in the final ballot resolution stage. WG Chair Mike Spurlock (Spurlock Engineering Services, LLC) was not in attendance. WG Vice Chair Poorvi Patel (EPRI) reported that Draft 1.7 completed the 3rd recirculation on October 12, 2024 with a 98% approval rate and an 89% response rate. No comments were received. The final review by RevCom is expected to take place on December 10, 2024.

## WG C57.12.10, Standard Requirements for Liquid-Immersed Power Transformers – Scott Digby

This working group met on Monday with 93 attendees. 38 individuals requested membership. 24 members from the task force carried over as new working group members. The new working has a total of 62 members. The current document expires at the end of 2027.

WG Chair Scott Digby (Duke Energy) discussed the revising plan with the group. The document will be circulated to the WG membership in “straw ballot” type format to gather comments for discussion and revision consideration. The group will then determine the next steps based on return/response from document circulation.

The complete meeting minutes can be found in Attachment K.4.7. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## TF C57.140, Guide for Evaluation and Reconditioning of Liquid-Immersed Power Transformers – Sanjib Som

This task force had their second in-person meeting on Monday with 64 attendees and achieved a quorum. After much discussion, the task force approved the following new Title and Scope (not including Purpose):

Title: IEEE Guide for Life Extension of Liquid Immersed Power Transformers and Reactors

Scope: This document provides guidelines to assist the user in extending the useful life of liquid-immersed Power Transformers and Reactors.

Being mindful of the definitions of Reconditioning and Refurbishment, the task force noted that the Chairs of C57.140, C57.637, and C57.170 should coordinate and make sure that there is clear understanding that this document (C57.140) would not encroach on the scope of C57.637 or C57.170.

TF Chair Sanjib Som (Pennsylvania Transformer) made a motion to create a PAR to revise C57.140, Guide for Evaluation and Reconditioning of Liquid-Immersed Power Transformers. Ewald Schweiger (Siemens Energy) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.8. Marcos Ferreira (Quanta Technology) is now the group’s new chair.

The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## Revision of C57.125, Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors – Hakan Sahin

This working group met on Monday and achieved a quorum. WG Chair Hakan Sahin (Virginia/Georgia Transformer) reminded the group of the tight timeline for completing a draft guide. The current document expires on December 31, 2025.

The group reviewed and approved the proposed modifications to Section 4.2 (Flowchart) and Table 8. With this, the WG completed the review of the existing document with appropriate revisions approved by the WG. The plan is to complete a draft document with all proposed revisions before the Spring 2025 meeting and proceed with ballot. The WG may request a PAR extension at the next meeting as needed.

The complete meeting minutes can be found in Attachment K.4.9. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## WG C57.157, Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid-Immersed Transformers – Adam Sewell

This working group met on Tuesday with a total of 37 attendees. A quorum was achieved. The PAR was approved June 2023 and expires December 2027. WG Chair Adam Sewell (Quality Switch, Inc.) reviewed the project timeline with the group. Attila Gyore (Midel) presented at the meeting on topic of synthetic esters.

The complete meeting minutes can be found in Attachment K.4.10. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## WG C57.170, Guide for the Condition Assessment of Liquid Immersed Transformers, Reactors and Their Components – Kumar Mani

This working group met on Tuesday and achieved a quorum. WG Chair Kumar Mani (Duke Energy) reported that an initial ballot was completed with 80% response rate and 91% approval rate. A total of 172 comments were received including 37 technical and 135 editorial/general comments. The group plans to resolve all comments by the end of this year and go for recirculation in the first quarter of 2025.

The complete meeting minutes can be found in Attachment K.4.11. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## Revision of C57.150, Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or Higher – Greg Anderson

This group didn’t meet in St. Louis. The revised guide was approved in 2023. According to the standards report, this document was marked as being published in 2023, with next revision due December 2033.

## WG PC57.17, Standard Requirements for Arc Furnace Transformers – Dom Corsi

This working group met on Tuesday with a total of 34 attendees. 13 of 21 members were present; therefore, a quorum was achieved. This was the third meeting as a working group. With one member removal and two newly added members, the WG now has 22 members.

The group reviewed the current working draft and the comments from the 1st straw ballot. The group agreed to go for 2nd straw ballot for additional comments.

The WG Chair Dom Corsi (Doble Engineering) transitioned chair position to Secretary (Jason Varnell, Doble Engineering) who will preside as WG chair going forward. Trenton Williams (Advanced Power Tech.) will be the new secretary.

The complete meeting minutes can be found in Attachment K.4.13. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## WG C57.107, Recommended Practice for Developing Short-Term Overexcitation V/Hz Curves for Transformers Directly Connected to Generators – Joe Watson

This working group didn’t meet in St. Louis. This document was approved and published in 2024 with next revision due December 2034.

## WG Liquid-Immersed Phase-Shifting Transformers 60076-57-1202 – Ewald Schweiger

This working group met on Tuesday with 50 attendees and achieved a quorum. WG Chair Ewald Schweiger (Siemens Energy) provided an update on document review since the Vancouver meeting.

Kevin Juchem (Hitachi Energy) and Luc Dorpmanns (Royal SMIT Transformers) presented ideas about harmonization and redistribution of contents in Guide C57.135 and Standard 60076-57-1202 and the input from IEC Polish NC for the separate measurements of the impedances of the HV/LV (series/exciter unit). The group recognized that this is a unique opportunity to harmonize, clean up, and enhance the contents of three relevant documents simultaneously: C57.135 (60076-57-135) Guide for the Application, Specification, and Testing of Phase-Shifting Transformers, IEEE/IEC 60076-57-1202 International Standard Power Transformers, Part 57-1202: Liquid-immersed Phase-Shifting Transformers, and C37.245 IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers.

This working group is seeking volunteers to review the existing document for improvements.

The complete meeting minutes can be found in Attachment K.4.15. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## WG C57.93, IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – Scott Reed

This working group met on Tuesday and achieved a quorum. This was the 1st official working group meeting.

WG Chair Scott Reed (MVA) presented the project timeline and an overview of the existing document.

The WG formed 7 task forces:

-TF1: Shipping Method and Assembly – Ryan Musgrove (Oklahoma Gas & Electric)

-TF2: Vacuum Processing Methods – Kyle Stechschulte (American Electric Power)

-TF3: Final Testing and Energization – Elizabeth Bray (Southern Company Services)

-TF4: Relocation and Field Repair – Alwyn VanderWalt (Electrical Consultants, Inc.)

-TF5: Maintenance – Weijun Li (Braintree Electric Light Department)

-TF6: Storage – Patrick Rock (American Transmission Co.)

-TF7: Editorial and Definitions – Jesse Duffy (Nashville Electric Service)

The task forces will report back to the WG at the Spring 2025 meeting with recommendations on how to revise the existing document.

The complete meeting minutes can be found in Attachment K.4.16. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## Liaison to PC57.93a Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – Scott Reed

This is liaison activity related to the topic of low temperature cold starts for transformers with natural ester fluid. The Chinese entity went out to ballot and are resolving comments. Because it was an entity PAR, individuals were not permitted to vote on the guide amendment.

There were no meeting minutes for this liaison activity.

## WG C57.153, Guide for Paralleling Regulating Transformers – Mark Tostrud

This working group met on Tuesday and achieved a quorum. WG Chair Mark Tostrud (Dynamic Ratings, Inc.) reviewed the PAR and project timeline with the group.

A modification to bibliography was discussed and approved. Proposed revisions to Annex C – Apparent Circulating Current were presented. The draft document will be updated with the proposed revisions and distributed to the WG. The definition of Reverse Power Flow was discussed. The WG decided there isn’t a need to define it at this point and will proceed with work. The WG will wait to see how C57.12.80 and C57.133 define Reverse Power Flow. The group requested volunteers to draft a section on acceptable actions during reverse power flow conditions.

The group also discussed the impact IEEE P3400 may have on the language in the guide.

The complete meeting minutes can be found in Attachment K.4.18. The next in-person meeting is planned for Spring 2025 in Denver, Colorado.

## Liaison to Entity PAR C57.145, Recommended Practice on Digital Twin Modeling and Analysis based on Spatial-temporal Data of Switch Cabinet and Transformer with 110kV and Below – Brian Sparling

This entity PAR was approved in June 2023. Liaison Brian Sparling (Kinectrics) provided the following progress report:

Draft 3.0 still under development

November 1, 2024 – Draft 3.0 completion

December 26, 2024 – Draft 4.0 completion

February 2, 2025 – Submit to Pre-MEC and MEC

April 2, 2025 – Submit draft to PE/TR for approval

June 1, 2025 – Initiate ballot invitation

There were no meeting minutes for this liaison activity.

## Liaison to Entity PAR “Guide for Power Transformers for Low-frequency (10-30Hz) Power Transmission”

Sheldon Kennedy (Sheldon P. Kennedy Engineering, PLLC), the liaison to this entity PAR, provided the following progress report:

Draft 1 still under development

November 27, 2024 – Draft 1.0 Completion

December 12, 2024 – The Second WG Meeting and Approval of Draft 1.0

February 17., 2025 – The Third WG Meeting and Approval of Draft 2.0

April 22, 2025 – The Fourth WG Meeting and Approval of Draft 3.0 (Ballot Ready Draft)

June 18, 2025 – The Fifth WG Meeting (If needed)

July 16, 2025 – Submit to Mandatory Editorial Coordination (MEC)

September 3, 2025 – Update draft based on MEC Report

November 19, 2025 – Initiate SA Ballot

There were no meeting minutes for this liaison activity.

# Old Business

**Discussion on Creation of a New IoT Document – Hemchandra Shertukde and Sanjib Som**

Study group chair Hemchandra Shertukde (University of Hartford) said that he contacted an engineer with IoT experience and talked about the possibility of putting together a short article on this topic. Dan Sauer (Eaton Corporation) made a motion to table the topic until further solid update becomes available. Stephen Shull (BBC Electrical Services, Inc.) seconded the motion. The motion passed with unanimous approval.

**IEEE 693 Recommended Practice for Seismic Design of Substations – Substations Standards Committee**

PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) provided an update on the so-called IEEE 693 Amendment “P693a” and Bushings Subcommittee Chair Eric Weatherbee’s efforts appealing IEEE SA’s approval of the “Amendment”. Note that Eric Weatherbee is affiliated with PCORE Electric. Transformers Committee Chair David Wallach (Duke Energy) confirmed that the “Amendment” was approved and Eric Weatherbee’s appeal was turned down. PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) pointed out that any changes in the next revision of IEEE 693 would likely affect power transformer designs. We need volunteers from the Power Transformers and Bushings subcommittees, especially users and transformer manufacturers, to participate in the review and ballot of IEEE 693 once the document is open for revision. Standards Coordinator Stephen Shull (BBC Electrical Services, Inc.) echoed the Chair’s comments and urged participation from bushing and transformer experts. Anyone who is interested in getting involved is encouraged to contact the PTSC Chair at [ryan.musgrove@ieee.org](mailto:ryan.musgrove@ieee.org). The Chair plans on emailing all PTSC members and guests when further information about the next revision becomes available.

# New Business

**60076-16 Power Transformers – Part 16: Transformers for Wind Turbine Applications – Revision due 2028**

The revision of this document is due in 2028. The Chair will appoint a volunteer to lead a study group to review the document and suggest next steps. The Chair has noted that PAR study group will be postponed until work is completed on at least two of the ongoing PTSC standards to help try to prevent future meeting scheduling conflicts. This will fall under old business to be reviewed at the next subcommittee meeting.

It should be noted that after the Performance Characteristics Subcommittee meeting and further conversation with the standards coordinator, it appears that IEC/IEEE 60076-16 was improperly marked as belonging to the Power Transformers Subcommittee and it actually belongs to the Performance Characteristics Subcommittee

**60214-2 Draft Guide for Tap-Changers – Part 2: Application Guide – Revision due 2029**

The revision of this document is due in 2029. The Chair will appoint a volunteer to lead a study group to review the document and suggest next steps. The Chair has noted that PAR study group will be postponed until work is completed on at least two of the ongoing PTSC standards to help try to prevent future meeting scheduling conflicts. This will fall under old business to be reviewed at the next subcommittee meeting.

**C57.148 – Standard for Control Cabinets for Power Transformers – Revision due 2030**

The revision of this document is due in 2030. The Chair will appoint a volunteer to lead a study group to review the document and suggest next steps. The Chair has noted that PAR study group will be postponed until work is completed on at least two of the ongoing PTSC standards to help try to prevent future meeting scheduling conflicts. This will fall under old business to be reviewed at the next subcommittee meeting.

**SCATE P3476 – Standard for Unique IDs and Smart Tags for Supply Chain and Asset Traceability for the Electric Grid – Alicia Farag**

P3476 Work Group Chair Alicia Farag (LocusView) gave a presentation titled Supply Chain and Asset Traceability for Energy (SCATE) on industry standard unique IDs and smart tags (QR codes) for power equipment. This standard addresses unique identification numbers for electric grid assets including generation, transmission, substation, distribution, storage, and electric vehicle charging stations. The unique identifiers include a universal catalog identifier, manufacturer identifier, and traceability identifier.

Existing IEEE standard C57.12.35 (IEEE Standard Bar Coding for Distribution Transformers and Step-Voltage Regulators) covers manufacturer, serial number, manufacture date, customer catalog ID, etc. but such information may not include all critical attribute data. SCATA P3476 covers industry standard catalog IDs with all critical attributes that are embedded directly into a smart tag that does not require look-up in another system and is consistent across all asset types (not just transformers).

The scope of the IEEE P3476 WG is to convert the SCATE specification into a standard and develop unique ID data models for each asset type.

The presentation touched on use cases and success stories from the natural gas industry. The presentation also illustrated various asset types and associated data model.

P3476 Work Group Chair Alicia Farag (LocusView) mentioned that the following asset types will likely be prioritized for Version 1 of the document and the WG will need Subject Matter Experts (SMEs) for each of these in the work group:

Liquid-filled power and distribution transformers, C57.12.00

Dry-type power and distribution transformers, C57.12.01

Instrument transformers, C57.13.5

Voltage regulators, C57.15

Extensive discussions were carried out during the Q&A session following the presentation. Topics included approximate project timeline (raised by Timothy Raymond, Consultant), optional attributes such as customer purchase order number (raised by Ewald Schweiger of Siemens Energy), advantages of interchangeability & mutual aid assistance (raised by Francis Mills of Power Engineers), potential impact on OEM’s existing inventory/tracking systems (raised by Joshua Yun of Virginia Transformer Corp.), whether serial number being part of the new ID and a potentially challenging decoding process as time changes (raised by Trenton Williams of Advanced Power Technologies), and similar activities on the IEC side (raised by Brian Sparling of Kinectrics).

Gary Hoffman (Advanced Power Technologies) pointed out that the Transmission & Distribution Committee is the sponsor committee of P3476.

The presentation given was a condensed version. Once available, a copy of the full presentation provide by Alicia Farag will be posted on the PTSC website: https://www.transformerscommittee.org/subcommittees/powertransf/

**Power System Relaying and Control Committee Seeking Liaison – Michael Thompson**

Power System Relaying and Control Committee (PSRC) Chair Michael Thompson (SEL Engineering Services, Inc.) introduced himself and shared his view of mutual benefits of having a liaison from the Transformers Committee participate in PSRC’s activities. Participation from PTSC would be especially important due to PSRC’s involvement in protection and control of power transformers and reactors. The PSRC group meets 3 times a year. A liaison attending PSRC meetings at least once a year would be beneficial. The goal is to share updates/reports between the two committees. Anyone who is interested in being the liaison is encouraged to contact Michael Thompson at [michael.thompson@ieee.org](mailto:michael.thompson@ieee.org) and/or the PTSC Chair at [ryan.musgrove@ieee.org](mailto:ryan.musgrove@ieee.org).

# Adjournment

The meeting adjourned at 2:45 p.m.

# Attachments

Attachment K.1 – Attendance

Attachment K.2 – Agenda

*Attachment K.4.1 – C57.131 (No Meeting)*

Attachment K.4.2 – C57.156 Minutes

*Attachment K.4.3 – C57.116 (No Meeting)*

Attachment K.4.4 – IEEE 638 Minutes

Attachment K.4.5 – C57.135 Minutes

*Attachment K.4.6 – C57.143 (No Meeting)*

Attachment K.4.7 – C57.12.10 Minutes

Attachment K.4.8 – C57.140 Minutes

Attachment K.4.9 – C57.125 Minutes

Attachment K.4.10 – C57.157 Minutes

Attachment K.4.11 – C57.170 Minutes

*Attachment K.4.12 – C57.150 (No Meeting)*

Attachment K.4.13 – C57.17 Minutes

*Attachment K.4.14 – C57.107 Minutes (No Meeting)*

Attachment K.4.15 – 60076-57-1202 Minutes

Attachment K.4.16 – C57.93 Minutes

*Attachment K.4.17 – Liaison to PC57.93a (No Meeting Minutes)*

Attachment K.4.18 – C57.153 Minutes

*Attachment K.4.19 – Liaison to Entity PAR for C57.145 (No Meeting Minutes)*

*Attachment K.4.20 – Liaison to Entity PAR for Guide for Power Transformers for Low-Frequency Power Transmission (No Meeting Minutes)*

**Attachment K.1**

**Attendance Record**

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| --- | --- | --- | --- |
| **Role** | **First Name** | **Last Name** | **Company** |
| Member | Kayland | Adams | Prolec GE Waukesha |
| Guest | Anthony | Alexander | Hitachi Energy |
| Guest | Rehan | Ali | Siemens Energy |
| Guest | Rehan | Ali | Siemens Energy, Inc. |
| Guest | Robert | Allison | Dominion Energy |
| Member | Tauhid Haque | Ansari | Hitachi Energy |
| Guest | Elise | Arnold | SGB |
| Member | Onome | Avanoma | MJ Consulting |
| Guest | Paulo | Avelino | Hitachi Energy BR |
| Member | Donald | Ayers | Ayers Transformer Consulting |
| Member | Gilles | Bargone | FISO Technologies Inc. |
| Guest | Gilles | Barthes | Hitachi Energy |
| Member | Christopher | Baumgartner | We Energies |
| Guest | Hugo | Bayona | H-J Family of Companies |
| Guest | Jason | Beaudoin | Weidmann Electrical Technology |
| Guest | Orlando | Benitez | Hyosung HICO |
| Member | Enrique | Betancourt | Prolec GE |
| Guest | Edwin | Betancourt | Siemens Energy |
| Guest | Naveen | Bhardwaj | Trench Group |
| Guest | Kevin | Biggie | Weidmann Electrical Technology |
| Member | Wallace | Binder | WBBinder Consultant |
| Guest | Piotr | Blaszczyk | Specialty Transformer Components LLC |
| Member | Daniel | Blaydon | Baltimore Gas & Electric |
| Member | William | Boettger | Boettger Transformer Consulting LLC |
| Guest | Sanket | Bolar | Oncor Electric Delivery |
| Member | Paul | Boman | Hartford Steam Boiler |
| Member | Jeremiah | Bradshaw | Bureau of Reclamation |
| Guest | Garrett | Bradshaw | Howard Industries |
| Guest | Samuel | Brodeur | Hitachi ABB Power Grids |
| Guest | Steven | Brzoznowski | Bonneville Power Administration |
| Member | David | Calitz | Siemens Energy |
| Guest | Juan Alfredo | Carrizales | Prolec GE |
| Member | Juan | Castellanos | Prolec GE |
| Guest | Vivian | Chan | Hitachi Energy |
| Guest | Luiz | Cheim | Hitachi Energy |
| Guest | Caleb | Colby | Schneider Electric |
| Member | Craig | Colopy | Retired - General Interest |
| Guest | Michael | Craven | Qualus Corp. |
| Guest | Janet | Crockett | Fayetteville PWC |
| Member | Juan Carlos | Cruz Valdes | Prolec GE |
| Guest | Marcos | Czernorucki | Hitachi Energy |
| Guest | Roberto | Da Silva | Maschinenfabrik Reinhausen |
| Guest | Tim | Dappen | Cargill |
| Guest | Thomas | Dauzat | AEP-SWEPCO |
| Member | Eric | Davis | Consultant |
| Guest | Pouneh | Davoudi | Delta Star Inc. |
| Guest | Gabriel | Delgado | Invenergy |
| Member | Scott | Digby | Duke Energy |
| Guest | Nikolaus | Dillon | Dominion Energy |
| Guest | Paul | Dolloff | East Kentucky Power |
| Guest | Jeffrey | Door | H-J Family of Companies |
| Guest | Peter | Dopplmair | Trench Group |
| Guest | Luc | Dorpmanns | Royal SMIT Transformers |
| Guest | Jesse | Duffy | Nashville Electric Service |
| Guest | Kenneth | Dugger | Voltyx/NASS |
| Guest | Janko | Dzodan | Koncar D&ST |
| Guest | William | Elliott | AEP-SWEPCO |
| Guest | Eric | Elson | SDGE |
| Member | Evgenii | Ermakov | Hitachi Energy |
| Guest | Egui | Espitia | Reinhausen Mfg |
| Member | Reto | Fausch | RF Solutions |
| Member | Marcos | Ferreira | Quanta Technology |
| Guest | Joseph | Foldi | Foldi & Associates, Inc. |
| Guest | Raymond | Frazier | Ameren |
| Guest | Jose | Gamboa | H-J Family of Companies |
| Member | Eduardo | Garcia Wild | Siemens Energy |
| Guest | Miguel | Garcia Wild | Hitachi Energy |
| Guest | James | Gardner | Prolec GE Waukesha |
| Guest | Joshua | Garner | Independent Dielectrics |
| Guest | Dragana | Gasic | Koncar D&ST |
| Guest | Orlando | Giraldo | H-J Family of Companies |
| Member | Ramsis | Girgis | Hitachi Energy |
| Guest | Alireza | Gorzin | Black & Veatch |
| Guest | Brad | Grooms | NTS |
| Member | Ismail | Guner | Hydro-Quebec |
| Member | Niklas | Gustavsson | Hitachi Energy |
| Member | Attila | Gyore | MIDEL |
| Guest | Jesse | Hall | Virginia Transformer Corp. |
| Guest | Didier | Hamoir | Transformer Protector Corp |
| Guest | Kevin | Hampton | Siemens Energy |
| Guest | Eric | Hatton | Tempel |
| Guest | Ronald | Hernandez | Doble Engineering Co. |
| Guest | William | Herron | Reinhausen |
| Member | Gary | Hoffman | Advanced Power Technologies |
| Member | Saramma | Hoffman | PPL Electric Utilities |
| Member | Ryan | Hogg | Bureau of Reclamation |
| Guest | Thomas | Holifield | Howard Industries |
| Guest | Traci | Hopkins | H2Scan |
| Member | Philip | Hopkinson | HVOLT Inc. |
| Guest | Zinan | Huang | Sieyuan |
| Guest | Marion | Jaroszewski | Delta Star Inc. |
| Guest | Nicholas | Jensen | Delta Star Inc. |
| Member | John | John | Virginia Transformer Corp. |
| Guest | Christopher | Johnson | Oncor Electric Delivery |
| Member | Akash | Joshi | Kimley-Horn |
| Member | Kurt | Kaineder | Trench Austria |
| Guest | Sergiusz | Kapka | Hitachi Energy |
| Guest | Mick | Kasonga | ONCOR Electric |
| Guest | Jerzy | Kazmierczak | Hitachi Energy |
| Guest | Thomas | Keels | kEElectric Engineering PLLC |
| Member | Sheldon | Kennedy | Sheldon P. Kennedy Engineering, PLLC |
| Guest | Qasim | Khan | Neetrac Georgia Tech |
| Guest | Yeounsoo | Kim | MEPPI |
| Guest | Seungmo | Kim | Hyosung HICO |
| Guest | Yonghui | Kim | ILJIN Electric |
| Member | Zan | Kiparizoski | Howard Industries |
| Member | Egon | Kirchenmayer | Siemens Energy |
| Guest | Anton | Koshel | Delta Star Inc. |
| Guest | Andreas | Kurz | MR |
| Guest | Mateusz | Kwiatkowski | Hitachi Energy |
| Guest | Ashwini | Labh | Hitachi Energy |
| Guest | Donald | Lamontagne | Arizona Public Service Co. |
| Guest | Fernando | Leal | Prolec GE |
| Guest | Jihun | Lee | HD HYUNDAI electric |
| Guest | Junho | Lee | Hyundai Electric |
| Guest | Stefan | Lembacher | Siemens Energy |
| Secretary | Weijun | Li | Braintree Electric Light Dept. |
| Guest | Luc | Loiselle | Tetra Tech |
| Guest | Xose | Lopez-Fernandez | Universidade de Vigo |
| Member | Jose | Machain | Prolec GE |
| Guest | Jinesh | Malde | M&I Materials Inc. |
| Member | Kumar | Mani | Duke Energy |
| Guest | Francis | Mantoan | Siemens Energy |
| Guest | Moses | Manzano | Hyosung HICO |
| Guest | Daniel | Martinez | Lamination Specialties Inc. |
| Guest | Daniel | Martinez |  |
| Guest | Katherine | Marulanda | Magnetron |
| Member | Thomas | Melle | HIGHVOLT |
| Guest | Toni | Mellin | Vaisala |
| Guest | Omar | Mendez Zamora | Prolec GE |
| Guest | Philip | Miller | Memphis Light, Gas & Water |
| Member | Francis | Mills | Power Engineers, Inc. |
| Member | Emilio | Morales-Cruz | Qualitrol Company LLC |
| Guest | Marta | Munoz | Hitachi Energy |
| Guest | Fredy | Murcia | Siemens Energy |
| Guest | Hugo | Murillo | H-J Family of Companies |
| Member | David | Murray | Tennessee Valley Authority |
| Chair | Ryan | Musgrove | Oklahoma Gas & Electric |
| Guest | Anthony | Natale | HICO America |
| Guest | Mark | Newbill | Hitachi Energy |
| Guest | Rudolf | Ogajanov | Hitachi Energy |
| Member | Anastasia | O'Malley | Consolidated Edison Co. of NY |
| Guest | Eduardo | Orozco | GE Grid Solutions |
| Guest | Parminder | Panesar | Virginia Transformer Corp. |
| Guest | Dean | Park | Hyosung HICO |
| Guest | Dwight | Parkinson | EATON Corporation |
| Member | Poorvi | Patel | Electric Power Research Institute (EPRI) |
| Guest | Sanjay | Patel | Smit Transformer |
| Guest | Pedro | Pedro | Efacec Energia |
| Guest | Verena | Pellon | Florida Power & Light |
| Guest | Harry | Pepe | Phenix Technologies, Inc. |
| Guest | Jason | Perkins | Moehn Electrical |
| Guest | Goran | Plisic | Siemens Energy KPT |
| Guest | Christoph | Ploetner | Siemens Energy |
| Guest | Dominic | Pollaro | NASS |
| Guest | Homero | Portillo | Advanced Power Technologies |
| Guest | Nicholas | Post | WEC Energy Group |
| Guest | Gustavo | Prado | Siemens Energy |
| Member | Ion | Radu | Hitachi Energy |
| Guest | Timothy | Raymond | Electric Power Research Institute (EPRI) |
| Member | Scott | Reed | MVA |
| Guest | Perry | Reeder | PA Transformer |
| Guest | Sebastian | Rehkopf | Maschinenfabrik Reinhausen |
| Guest | David | Reyes | ONCOR |
| Guest | Michael | Richardson | Ameren |
| Guest | Diego | Robalino | Megger |
| Guest | Rodrigo | Ronchi | WEG-Voltran |
| Guest | Yuri | Rossini | Siemens Energy |
| Member | Marnie | Roussell | Entergy |
| Member | Mickel | Saad | Hitachi Energy |
| Member | Hakan | Sahin | Virginia/Georgia Transformer |
| Member | Dinesh | Sankarakurup | Duke Energy |
| Guest | Amitabh | Sarkar | Virginia Transformer Corp. |
| Member | Daniel | Sauer | EATON Corporation |
| Member | Markus | Schiessl | SGB |
| Guest | Eric | Schleismann | Southern Company Services |
| Guest | Alfons | Schrammel | Siemens Energy |
| Member | Dan | Schwartz | Quality Switch, Inc. |
| Member | Ewald | Schweiger | Siemens Energy |
| Member | Cihangir | Sen | Duke Energy |
| Member | Adam | Sewell | Quality Switch, Inc. |
| Guest | Jeremy | Sewell | Quality Switch, Inc. |
| Member | Abdul Majid | Shaikh | Delta Star Inc. |
| Member | Hemchandra | Shertukde | University of Hartford |
| Member | Stephen | Shull | BBC Electrical Services, Inc. |
| Guest | Stefan | Siebert | BROCKHAUS Measurements |
| Guest | Jonathan | Sinclair | Black & Veatch |
| Guest | Christopher | Slattery | FirstEnergy Corp. |
| Guest | Jason | Snyder | FirstEnergy Corp. |
| Guest | Muhammad Abdullah | Sohail | Trench |
| Member | William | Solano | Reinhausen Manufacturing Inc. |
| Member | Sanjib | Som | Pennsylvania Transformer |
| Guest | Jonathan | Sonclair | Black and Veatch |
| Guest | Brian | Sparling | Kinectrics |
| Member | Brad | Staley | Leeward Energy |
| Member | Kyle | Stechschulte | American Electric Power |
| Guest | Hampton | Steele | Tennessee Valley Authority |
| Guest | Andrew | Steineman | Delta Star Inc. |
| Guest | Sunny | Swarna | Virginia Transformer Corp |
| Guest | Charles | Sweetser | OMICRON electronics Corp USA |
| Member | Craig | Swinderman | Mitsubishi Electric Power Products |
| Guest | Jonathan | Tan | Northern Transformer |
| Member | Troy | Tanaka | Burns & McDonnell |
| Guest | Samuel | Tekle | WEG Transformers USA |
| Guest | Jesse | Theberge | Tempel |
| Guest | Andreas | Thiede | Highvolt |
| Guest | Scott | Thomas | Hitachi Energy |
| Member | Ryan | Thompson | Burns & McDonnell |
| Guest | Michael | Thompson | SEL Engineering Services, Inc. |
| Guest | James | Thompson | T & R Service Company |
| Guest | Timothy | Tillery | Howard Industries |
| Guest | Francis | Topol | Siemens Energy KPT |
| Member | Mark | Tostrud | Dynamic Ratings, Inc. |
| Vice-Chair | Alwyn | Van Der Walt | Electrical Consultants, Inc. |
| Member | Ajith | Varghese | Prolec Energy |
| Member | Jason | Varnell | Doble Engineering Co. |
| Guest | Juan | Velasquez | Magnetron |
| Member | Rogerio | Verdolin | Verdolin Solutions Inc. |
| Guest | Karsten | Viereck | Maschinenfabrik Reinhausen |
| Guest | Krishnamurthy | Vijayan | Pennsylvania Transformers |
| Member | Dharam | Vir | Prolec GE |
| Member | Richard | vonGemmingen | Dominion Energy |
| Member | Pragnesh | Vyas | Sunbelt-Solomon |
| Guest | John | Wagner | AEP |
| Member | David | Wallach | Duke Energy |
| Guest | Alan | Washburn | Burns & McDonnell |
| Guest | Joshua | Watson | NPPD |
| Member | Bruce | Webb | Knoxville Utilities Board |
| Guest | Matthew | Webb | GE Vernova |
| Guest | Drew | Welton | Intellirent |
| Guest | Peter | Werelius | Megger |
| Member | Daniel | Weyer | Monolith |
| Guest | Joe | White | Power Engineers |
| Guest | Leon | White | Hedrich |
| Member | William | Whitehead | H2scan Corporation |
| Member | Trenton | Williams | Advanced Power Technologies |
| Member | Jeffrey | Wright | Duquesne Light Co. |
| Guest | Fei | Yang | Hitachi Energy |
| Guest | Tim | Young | Hitachi Energy |
| Guest | Zhenguan | Yu | Sieyuan Toshiba |
| Member | Joshua | Yun | Virginia Transformer Corp. |
| Guest | Malia | Zaman | IEEE |
| Guest | Jie | Zhang | Chint ELECTRIC CO.,LTD |
| Member | Peter | Zhao | Hydro One |
| Guest | Zhu | Zhixiang | Chint ELECTRIC CO.,LTD |
| Member | Kris | Zibert | Allgeier, Martin and Associates |
| Member | Waldemar | Ziomek | PTI Transformers |

**Attachment K.2**

**Agenda**

1. Call to order
2. Distribution of Roster
3. Chair remarks
4. New Members
5. Determine quorum
6. Approval of agenda, approval of previous meeting minutes (sent by e-mail)
7. Working Group and Task Force reports
   1. WG Revision of C57.131, Tap Changers (no meeting) …………… Craig Colopy
   2. WG C57.156, Guide for Tank Rupture Mitigation……..…. ………….. Peter Zhao
      1. Monday Oct 28th, 9:30-10:45 – Grand Ballroom GH (4)
   3. WG Revision of C57.116, GSU Transformers (Completed 2022 – no meeting)……….. ………….. Weijun Li
   4. WG Class 1E Transformer for Nuclear Power gen Std. 638 ………….. Craig Swinderman
      1. Monday Oct 28th, 11:00-12:15 – Grand Ballroom F (4)
   5. WG C57.135, Guide for Phase shifting Transformers………………… ………..……Ewald Schweiger
      1. Monday Oct 28th, 1:45-3:00 – Grand Ballroom GH (4)
   6. WG Revision of C57.143, Monitoring Guide (no meeting) ………….. Mike Spurlock
   7. WG Requirement for Liquid-Immersed Power TR – C57.12.10 …………. Scott Digby
      1. Monday Oct 28th, 3:15-4:30 – Grand Ballroom D (4) First meeting
   8. TF Guide for Evaluation & Reconditioning of Liquid Immersed TR C57.140………. ………… Sanjib Som
      1. Monday Oct 28th, 3:15-4:30 – Grand Ballroom E (4)
   9. WG Revision of C57.125, Failure Investigating and Reporting ………….. Hakan Sahin
      1. Monday Oct 28th, 4:45-6:00 – Grand Ballroom GH (4)
   10. WG C57.157, Guide for Life test of Switch Contacts……… …………… Adam Sewell
       1. Tuesday Oct 29th, 8:00-9:15 – Grand Ballroom C (4)
   11. WG C57.170, Condition Assessment Guide ………….. Kumar Mani
       1. Tuesday Oct 29th, 9:30-10:45 – Grand Ballroom D (4)
   12. WG Revision of C57.150, Transportation Guide (No meeting) …………… Greg Anderson
   13. WG C57.17, Standard Requirements for Arc Furnace Transformers…………….......................... Dom Corsi
       1. Tuesday Oct 29th, 11:00-12:15 – Grand Ballroom C (4)
   14. WG C57.107, Transformer Volts per Hertz (No meeting)…… ………….. Joe Watson
   15. WG Liquid Immersed Phase-Shifting Transformers 60076-57-1202 ………….. Ewald Schweiger
       1. Tuesday Oct 29th, 1:45-3:00 – Grand Ballroom C (4) First meeting
   16. WG C57.93, Installation and Maintenance Guide ………….. Scott Reed
       1. Tuesday Oct 29th, 3:15-4:30 – Grand Ballroom D (4) First meeting
   17. Liaison to PC57.93a – Installation and Maintenance Guide …………… Scott Reed
   18. WG C57.153, Guide for Paralleling Transformers …………… Mark Tostrud
       1. Tuesday Oct 29th, 4:45-6:00 – Grand Ballroom C (4)
   19. Liaison to Entity PAR C57.145 – Digital Twin for Power Equipment (DTPE) ………….. Brian Sparling
   20. Liaison to Entity PAR Guide for PT for Low-Frequency Power Transmission ………….. Sheldon Kennedy
8. Old business
   1. Discussion on the creation of a new IOT Document – Sanjib Som/Hemchandra Shertukde
   2. IEEE 693 Recommended Practice for Seismic Design of Substations – Substations Standards Committee – Need volunteers, especially users and transformer manufacturers.
9. New business
10. Adjournment

**Attachment K.4.2**

**Title:** WG Guide for Tank Rupture Mitigation PC57.156

**Time:** 9:30 AM- 10:45 AM, Monday, October 28, 2024

**Place:** Hyatt Regency St. Louis at the Arch, St Louis, MO, US

Chair: Peter Zhao Vice-Chair: Samuel Brodeur Secretary: Hakim Dulac

1. **Call to Order at 9:30am**
   1. Chair’s Remarks
   2. IEEE-SA Policies
      1. Call for Essential Patents slide presented and the group made no patent claims.
      2. Copyright policies slide presented
   3. Quorum

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| WG active member | Member required  for Quorum (> 50%) | Member present | Total attendance  (Guest and member) | Quorum established |
| 25 | 13 | 16 | 63 | Yes |

1. **Approval of Meeting Minutes**
   1. Motion to accept minutes of the spring 2024 meeting (Vancouver).
      1. Moved: Kevin Juchem
      2. Seconded: Eduardo Garcia
      3. The Spring 2024 meeting minutes were unanimously approved.
2. **Technical Topics**
   * 1. Presentation of a Rupture proof OLTC solutions by Marc Foata.
     2. Reviewed and discussed of the proposal for Sections 4.2.2 &4.2.3 by task force (Samuel Brodeur & Enrique Betancourt). The updated proposal from the discussions will be presented next week for further review and approval.
     3. Partially reviewed and discussed of the proposal for Section 5.2 by task force (Marc Foata, Chris Johnson, Ryan Musgrove, Samson Debass and Didier Hamoir) due to time limit, and will continue into next meeting.
3. **Action Items**
   1. None
4. **Unfinished Business**
   1. None
5. **New Business**
   1. None
6. **Next Meeting**
   1. Next Meeting date and location Denver Colarado, March 23-27 2025

Reported by:

Samuel Brodeur, P.Eng.

WG Vice-Chair

Attendance:

|  |  |  |
| --- | --- | --- |
| **Name** | **Affiliation** | **Member (yes, no or requested)** |
| Alex Zeigher | Hitachi Energy | no |
| Alireza Gorzin | Black & Veatch | yes |
| Andy Speegle | ENTERGY | no |
| Ashwin Padmanaban Iyer | Transformer protector Corp | requested |
| Avila Hugo | Hitachi Energy | requested |
| Chao Li | Eaton | requested |
| Christop Ploetner | Siemens Energy | no |
| Christopher Johnson | Oncor | Yes |
| David Calitz | Siemens Energy | yes |
| David Murray | TVA | yes |
| David Reyes | Oncor | no |
| Derek Hollrah | Burns&McDonnell | yes |
| Didier Hamoir | Transformer Protector CORP. | requested |
| Eduardo Garcia | Siemens Energy | yes |
| Egui Espitia | MR | no |
| Emilio Morales Cruz | Qualitrol | requested |
| Enrique Betancourt | Prolec-GE | no |
| Eric Schleismann | Southern Company | no |
| Francis Mills | Power Engineers | requested |
| Hector Garza | Orto de Mexico | no |
| Hugo Avila | Hitachi Energy | no |
| Ismael Guner | Hydro Quebec | no |
| James Gardner | Prolec-GE Waukesha | no |
| Jason Snyder | FirstEnergy | no |
| Jerzy Kazmierczak | Hitachi Energy | requested |
| Jihun Lee | HD HYUNDAI ELECTRIC | no |
| Joe Nims | Allen& Hoshall | no |
| Jose Luis Machain | Prolec GE | yes |
| Joshua Yun | Virginia Transformer | yes |
| Junho Lee | Hyundai Electric | yes |
| Kannan Veeran | Virginia Transformer | requested |
| Kevin Hampton | Siemens Energy | no |
| Kevin Juchem | Hitachi Energy | no |
| Luc Loiselle | Tetra Tech | yes |
| Luke Wang | BC hydro | requested |
| Malia Zaman | IEEE SA | no |
| Manan Pandya | Siemens energy | requested |
| Marc Foata | MR | yes |
| Martin Munoz | Orto de Mexico | requested |
| Michael Botti | Hyosung HICO | yes |
| Michael Nolte | Kiewit | requested |
| Moses Manzano | Hyosung HICO | yes |
| Niklas Gustavsson | Hitachi Energy | no |
| Olivier David Uhlmann | Reinhausen Canada Inc. | no |
| Omar Mendez | Prolec | no |
| Oscar Mendiola | Transformer Protector Corp. | no |
| Paul Dolloff | EKPC | no |
| Peter Zhao | Hydro One | yes |
| Rehan Ali | Siemens Energy, Inc. | no |
| Richard Vongemminen | Dominion Energy | no |
| Rogerio Verdolin | Verdolin Solutions | requested |
| Ryan Musgrove | Oklahoma Gas & Electric | no |
| Samson Debass | EPRI | yes |
| Samuel Brodeur | Hitachi Energy | yes |
| Sanjib Som | PTT, LLC | yes |
| Sebastian Rehkopf | MR | requested |
| Sergiusz Kapka | Hitachi Energy | no |
| Stephen Antosz | Consultant | no |
| Steven Brzoznowski | BPA | no |
| Sunny Swarna | Virginia Transformer Corporation | requested |
| Verena Pellon | NEXTERA | yes |
| Waldemar Ziomek | PTI Transformers | requested |
| William Solano | Voltyx | requested |

**Attachment K.4.4**

Document #: **638**

Document Title: **Qualification of Class 1E Transformers for Nuclear Power Generating Stations**

Chair: Craig Swinderman Vice Chair Robert Allison\* new

Secretary: Dominic Pollaro Percent Complete: 25%

Meeting Date: Monday, October 28, 2024 Time: 11:00 am to 12:15 pm.

Location: Hyatt Regency; St. Louis Missouri – Grand Ballroom F.

Current draft being worked on: 2.0 Dated: October 6, 2024

PAR Expiration date: December 31, 2027

Attendance: Members: 6 of 11

Guests: 27

Guests requesting membership: 2

Total\*: 33

\* A list of attendees is included at the end of these minutes.

**Meeting Minutes / Significant Issues / Comments:**

1. Meeting was called to order at 11:00am by Chair Craig Swinderman.
2. Presentation of Agenda:

The agenda for the meeting was submitted for review in advance of the meeting.

1. Presentation of IEEE Standards Slides:

IEEE Essential Patent Slides and Copyright policy were presented, and no issues received from the attendees.

1. Distribution of attendance sheets:
   1. Attendance was taken with a paper roster.
   2. Please send an email to craig.swinderman@meppi.com with the subject: P638 EMAIL to be added to the P638 email list.
2. Checking the Quorum:
   1. 6 out of 11 members were in attendance of the meeting so quorum was achieved.
3. Approval of the Meeting Minutes from Vancouver Spring 2024 and Agenda for Fall 2024:
   1. Approval of the Spring 2024 meeting unapproved minutes
      1. Ryan Musgrove motioned to approve.
      2. Robert Allison seconded.
      3. Motion was carried unanimously with no objections or abstentions. – Approved.
   2. Approval of the Fall 2024 agenda
      1. Robert Allison motioned to approve.
      2. Ryan Musgrove seconded.
      3. Motion was carried unanimously with no objections or abstentions. – Approved.
4. Chair announcements:

The PAR for revision of 638 was recently approved on December 6, 2023, and will expire on December 31, 2027. The target date for completing the updated standard is mid-2026 for submittal to start the ballot process.

Robert Allison of Dominion Energy volunteered to be the working group’s Vice Chair during this meeting.

1. Old work:

Discussed scope and purpose to IEEE 638, closely linked standards from IEEE/IEC 60780-323 and IEEE/IEC 60980-344. These dual logo standards are targeted to all safety related nuclear equipment, of which transformers are a subset. Both documents have been updated since IEEE 638 was published in 2013, and reviews have been done to target changes that have been made by these revisions.

Several changes reviewed from IEEE 323 2003 document to the 2016 revision. Much of the wording matched the previous version but needed to have further detailed reviews of specific sections. These reviews are in progress. Chair called for other volunteers to assist with reviews. IEEE/IEC 60780-323 2016 will be due for re-publication by December 2026, so we need to be aware of those potential changes as well.

Initial review topics of IEEE/IEC 60980-344 2020 was reviewed. Shared notes and comments from Robert Allison.

Chair continued with review of new chapters and additions to the IEEE/IEC 60980-344 standards for the 2020 version, noting that there appear to be some significant changes included in the 2020 version, which the corresponding material will require updating in 638.

Chair noted Sections 5 (Approaches to Transformer Qualifications) and 6 (Design Qualification Procedure) need to be reviewed for updating based on changes to IEEE/IEC 60780-323 and IEEE/IEC 60980-344.

Chair discussed request for deeper review and shared access to draft document.

1. New Work:

Robert Allison of Dominion Energy agreed to review and update Section 6 of the Draft 2.

Craig Swinderman presented Draft 2 to the working group and indicated specifically the areas where we are looking for help.

Craig reviewed the highlights.

Grace Guang Yuan of Hitachi Energy volunteered to assist with the ANNEX A review.

Jason Beaudoin of Weidmann volunteered to assist with the ANNEX A review with respect to solid insulation aging for oil immersed transformers.

1. Next meeting: Denver Colorado, Spring 2025\_ March 23-27, 2025
2. Close of meeting:

The meeting adjourned at 12:00 pm

Submitted by: Craig Swinderman Date: October 30, 2024

List of Meeting Attendees at Fall ‘24 Meeting, including affiliation & voting member status.

|  |  |  |
| --- | --- | --- |
| NAME | COMPANY | ROLE |
|  |  |  |
| WEIJU LI | BRAINTREE ELECTRIC | GUEST |
| GERALD SUMAN | ETSI | GUEST |
| PRESTON SIMON | ETSI | GUEST |
| CHERYL BASEL | WEG TRANSFORMERS | GUEST |
| JASON PERKINS | MOELEVE ELECTRIC | GUEST |
| MARK NEWBILL | HITACHI ENERGY | GUEST |
| ARVIND KUMAR | DELTA STAR | GUEST |
| ANDREW LUGGE | HITACHI ENERGY | GUEST |
| CHRIS WHITTEN | HITACHI ENERGY | GUEST |
| MARNIE ROUSSELL | ENTERGY | GUEST |
| ANDREAS THIEDO | HIGH VOLT DRESDEN | GUEST |
| GILLIS BARGONE | FISCO | GUEST |
| ZHINGSANG ZHU | CHINT | GUEST |
| SUDIP CHANDRA | DELTA STAR | GUEST |
| CHENY CAI | SIEYUAN ELECTRIC | GUEST |
| ALEX ZEIGHER | HITACHI ENERGY | GUEST |
| JASON BEAUDOIN | WEIDMANN | GUEST |
| DAVID MURRAY | TVA | GUEST |
| DOMINIC POLLARO | NASS | MEM |
| DAN SAUER | EATON | GUEST |
| KEYLAND ADAMS | PROLEC GE | GUEST |
| ANDY SPEEGLE | ENTERGY | GUEST |
| SAMMEL GRUSHIEWTZ | GE VERONA | GUEST |
| WILLIAM SOLANO | VOLTYX | GUEST |
| JOSE ANTONIO GONZALEZ | VIRGINIA TRANSFORMER | GUEST |
| EGUI ESPITIA | REINHAUSEN | GUEST |
| MARIA ZAMAN | IEEE SA | GUEST |
| YEONUNSOO KIM | MITSUBISHI ELECTRIC | MEM |
| CRAIG SWINDERMAN | MITSUBISHI ELECTRIC | MEM |
| RYAN MUSGROVE | OGE | MEM |
| ROBERT ALLISON | DOMINION ENERGY | MEM |
| ALFREDO CARRIZALES | PROLEC GE | GUEST |
| GRACE YUAN | HITACHI ENERGY | GUEST |

**Attachment K.4.5**

**Working Group C57.135 - IEC/IEEE 60067-57-135**

Chair: Ewald Schweiger  
Secretary: Richard von Gemmingen

**Guide for the Application, Specification and Testing of Phase-Shifting Transformers**

1. Meeting was called to order at 1:45 PM (CDT) on Tuesday October 28th, 2024 with Welcome & Chair’s remarks
2. Details about attendance:
   * 1. Attendance: 48
     2. Members: 15
     3. Guests: 33
3. Call for essential patents
   * 1. IEEE slides on essential patents have been provided in the meeting invitation, posted on the internet and were shown and a call for essential patents was made.   
         🡪 No essential patents or issues were reported.
4. Copyright policy
   * 1. Slides of the IEEE copyright policy have been provided in the meeting invitation, posted on the internet and were shown and request made to identify any potential copyright issues.  
        🡪 No issues were reported.
5. Quorum check
   * 1. Total number of members is 26 requiring 14 members for quorum.   
        First member couple had only 12 in attendance. Decision was to continue with status update on IEC / IEEE 60076-57-135 and re-check attendance later.
6. IEC Decisions Taken in Rome, April 18, 2024
   * 1. Kevin Juchem and Ewald Schweiger presented information from Rome meeting
     2. IEC TC 14 decides to participate in revision of IEC/IEEE 600076-57-1202
     3. Further decided to transfer both aspects, phase-shifting standard (60076-57-1202) and technical guideline standard (60076-57-135), into one new MT (Maintenance Team)
     4. Kevin Juchem is appointed as convenor for the new established MT 60076-57-PST.
     5. Members nominated by the IEC NC (National Committee) of 60076-57-PST were displayed
7. Presentation of proposals for content redistribution IEEE/IEC 60076-57-135 and IEEE/IEC 60076-57-1202
   * 1. Kevin Juchem and Luc Dorpmanns presented many observations from reviews and suggestions for updates of the documents.
     2. Topics included Definitions, Control Systems, Testing, Power flow, GIC, PST Load flows and more
     3. Note was made of the fact that IEC does not allow work GUIDE to be used and title will likely have to be changed to GUIDANCE or other term for IEEE/IEC 60076-57-135
     4. Particular note and discussion were on ARS (Advance Retard Switch) a technology that is mentioned in the standard but is am unique manufacture technology and it was challenged if this should belong in the document.
     5. The significant complexities of design, protection, reliability etc were discussed at length
     6. Suggestion was made that ARS should possibly be moved from the Standard to the Guide
8. Quorum recount was made at 2:10 and 14 members were present
9. 🡪establishing quorum.
10. Approval of agenda
11. Motion to approve agenda was made by Eric Davis and seconded by Luc Dorpmanns.  
    No discussion or objections were made.
12. Motion was carried unanimously with no objections or abstentions.
13. Approval of meeting minutes of the previous Spring 2024 meeting
14. Motion to approve agenda was made by Eric Davis and seconded by Luc Dorpmanns.  
    No discussion or objections were made.
15. Motion was carried unanimously with no objections or abstentions.
16. Status and Next steps were discussed for PAR update now with dual logo.
17. The information from Michael Thompson was shared that the Power System Relaying and Control Committee (PSRC) will establish a Study group for C37.345 (IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers) in the next PSRC meeting in January
18. Guide will need to be aligned with IEEE C37.245 (IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers) for consistency of definitions etc.
19. Noted on the task list are the needs of a PAR modification:  
    Title: Technical guideline for the Application, Specification, and Testing of Phase-Shifting Transformers  
    Document number: IEC/IEEE 60076-57-135
20. Review of needed work on Clauses 1-6 and 4-12 were discussed and call for volunteers was put out.
21. Old Business
    * None
22. New Business
23. Sanjay Patel commented on a need to clean up ARS
24. Patrycja Jarosz with IEEE/SA commented on need to modify PAR though it is not an urgent need now.
25. No other Discussions were presented
26. The meeting was adjourned at 2:32 PM (CST)
27. Next meetings (planned):
    * Virtual meeting – might be scheduled before March 2025
    * In-person meeting S25 – March 23-27, 2025 in Denver, CO

Respectfully submitted,   
  
Ewald Schweiger – WG Group Chair  
Richard von Gemmingen – WG Secretary

List of attendees for this meeting:

|  |  |  |  |
| --- | --- | --- | --- |
| **Last name** | **First name** | **Company / Affiliation** | **Status** |
| Antosz | Stephen | Consultant | G |
| Barker | Sean | Hitachi Energy | G |
| Beaudoin | Jason | Weidmann Electrical Technology | G |
| Calitz | David | Siemens Energy | G |
| Chan | Vivian | Hitachi Energy | G |
| Colopy | Craig | Retired | G |
| Corsi | Domenico | Doble Engineering Co. | G |
| Davis | Eric | Consultant | M |
| Dorpmanns | Luc | Royal SMIT Transformers B.V. | M |
| Espitia | Egui | Reinhausen Manufacturing Inc. | G |
| Garza | Hector | Orto de Mexico | G |
| Gonzalez Ceballos | Jose Antonio | Georgia Transformer | G |
| Grushiewrz | Samuel | GE Vernova | G |
| Hampton | Kevin | Siemens Energy | G |
| Heiden | Kyle | EATON Corporation | G |
| Hoffman | Saramma | PPL | M |
| Jarosz | Patrycia | IEEE SA | G |
| Juchem | Kevin | Hitachi Energy | M |
| Katapalli | Thrinadha | Virginia Transformer Corporation | M |
| Labh | Ashwini | Hitachi Energy | G |
| Lembacher | Stefan | Siemens Energy | G |
| McCullough | Douglas | Maxima / Hyundai | M |
| Mendez Zamora | Omar | Prolec GE | M |
| Munoz | Martin | Orto de Mexico | G |
| Musgrove | Ryan | OG+E | M |
| Orozco | Eduardo | GE Grid Solutions | G |
| Pandza | Thiomir | Siemens Energy | G |
| Patel | Sanjay | TD-Smit Transformers | M |
| Pavicic | Tomislav | Siemens Energy | G |
| Rashide | Adnan | Measurement Canada | G |
| Rehkopf | Sebastian | Maschinenfabrik Reinhausen GmbH | M |
| Reyes | David | Oncor | G |
| Sarkar | Amitabh | Virginia Transformer Corporation | G |
| Schindler | Stefan | Maschinenfabrik Reinhausen GmbH | G |
| Schrammel | Alfons | Siemens Energy | M |
| Schweiger | Ewald | Siemens Energy | M |
| Scott | Thomas | Hitachi Energy | G |
| Shimpi | Leena | MGM Transformer Co. | G |
| Solano | William | Voltyx | G |
| Stechschulte | Kyle D | AEP | M |
| Thompson | Michael | SEL Engineering Services, Inc. | M |
| Viereck | Karsten | Maschinenfabrik Reinhausen | G |
| Vir | Dharam | Prolec GE Waukesha | G |
| von Gemmingen | Richard | Dominion Energy | M |
| Weisensee | Matthew | Pacificorp | G |
| White | Joe | Power Engineers | G |
| Zeigher | Alex | Hitachi Energy | G |
| Zhangh | Jie | CHINT | G |

**Attachment K.4.7**

***WG for the Revision of C57.12.10***

***IEEE Standard Requirements for Liquid-Immersed Powe****r* Transformers

3:15 p.m. – 4:30 p.m. Central Time, Monday, October 28, 2024

Hyatt Regency St. Louis, St. Louis, Missouri, USA

*Unapproved Meeting Minutes*

WG Chair Scott Digby called the meeting to order at 3:19 p.m., Monday, October 28, 2024. As this was the first meeting of this new WG, the vice-chair role has not yet been established or filled. WG Secretary is Juan Castellanos.

Total Attendance was: 93

Members from previous TF 10 (total members from TF carried over to WG = 24)

Guests requesting Membership: 38 (membership granted thus quorum achieved)

Guests not requesting membership: 45

The total new WG membership stands now at 62. The meeting attendance list is included at the end of these minutes.

The WG Chair reviewed with the group the revision plan. The PAR was approved at the September 25,2024 NESCOM meeting with an expiration date of 12/31/2028, It was noted that the active document was published in 2017, so it expires 12/31/2027 (~3.0 years from now). So the chair looks forward to finish the revision by the end of year 2026 and allows the entire 2027 for the SA sponsor balloting process.

A proposed meeting agenda was presented by the WG Chair, with there being no comments so the meeting proceeded accordingly. Attendance rosters were circulated, with attendees being advised that as this is the first meeting of this group, that those requesting membership on the roster would be granted membership. The WG Chair made the requisite Call for Patents and there was none noted by those present. The WG Chair presented the IEEE SA Copyright Policy slides as well as the IEEE-SA activity participant behavior slides. There were no minutes approved because it was the first meeting of this WG.

During the meeting it was discussed how to proceed with the revision. The idea of creating task forces (TFs) was recognized as a more efficient way to get the work done. The possible TFs may be:

Section 2 Normative References

Section 3 Definitions and Acronyms

Section 4 Rating Data

Section 5 Construction

Section 6 OLTC

Annex A OLTC considerations

Ryan Musgrove, chair of the Power Transformers Subcommittee, recommended to create the Task Forces, and in parallel circulate the document among members of the WG calling for comments to get the best input for the next spring meeting. Regarding the last rounds of recirculation during the previous sponsor ballot in 2017, Patrycja Jarosz (IEEE-SA) to double check how to gather comments from previous revision.

Adriana Cisco (Salt River Project) commented there are conflicts between C57.12.00 and C57.12.10, minor wording issues, inconsistencies that should be resolved in this revision. Craig Colopy suggested having virtual work sessions between face-to-face meetings and splitting the task in sub-groups because the document is too large to be revised by the entire WG. The time slot for this WG is scheduled at the same time as the C57.12.00 TF for continuous revision, the chairman would look for a solution of this overlap. Two persons volunteered for the position of vice-chairman, Rogerio Verdolin (Verdolin Solutions) and Thomas Keels (Keelectric Engineering), the chairman to decide who would get the position.

The document to be circulated to WG membership in “straw ballot” type format to gather comments for discussion and revision consideration.

There being no new business, the meeting was adjourned.

The next in-person meeting will be at the Spring 2025 Transformers Committee Meeting in Denver, CO that is scheduled for March 23-27, 2025.

Respectfully Submitted,

Juan Castellanos, WG Secretary

|  |  |  |  |
| --- | --- | --- | --- |
| First Name | Last Name | Affiliation | Requested membership ? |
| Saramma | Hoffman | PPL | Member |
| Ryan | Musgrove | OG&E | Member |
| Rodrigo | Ronchi | Weg-Voltran | Member |
| Gabriel | Delgado | Invenergy | Member |
| John | John | Virginia Transformer | Member |
| Anthony | Natale | Hico America | Member |
| Didier | Hamoir | Transformer Protector Corp. | Member |
| Matthew | Webb | GE Vernova | Member |
| Juan | Castellanos | Prolec GE | Secretary |
| Scott | Digby | Duke Energy | Chair |
|  |  |  |  |
| Garret | Bradshaw | Howard industries | Y |
| Daniel | Martinez | IFE Canada | Y |
| Sami | Debass | EPRI | Y |
| Sunny | Swarna | Virginia Transformer | Y |
| Tim | Dappen | Cargill | Y |
| Scott | Thomas | Hitachi Energy | Y |
| Gustavo | Do Prado | Siemens Energy | Y |
| Ashwini | Labh | Hitachi Energy | Y |
| Piotr | Blaszezyk | Specialty Transformer Components | Y |
| Alireza | Gorzin | Black and Veatch | Y |
| Brad | Stacey | Leeward Renewable Energy | Y |
| Will | Elliot | ACP/SWEPCO | Y |
| Kaman | Neeran | VTC/GTC | Y |
| Yeun Soo | Kim | MEPPI | Y |
| Caleb | Colby | Schneider Electric | Y |
| Bill | Whitehead | H2 Scan | Y |
| Thomas | Keels | Keelectric Engineering | Y |
| Dominic | Polard | NASS | Y |
| Kayland | Adams | Prolec GE - Waukesha | Y |
| Shankar | Nambi | Bechtel Energy | Y |
| Matt | Weisensse | Pacificorp | Y |
| Florin | Faur | Prolec GE - Waukesha | Y |
| Luke | Wang | BC Hydro | Y |
| Rashid | Hussain | Mississippi State University | Y |
| Jason | Snyder | First Energy | Y |
| Kyle | Stechschulte | AEP | Y |
| Egui | Espitia | Reinhausen Manufacturing | Y |
| Martín | Muñoz | Orto de Mexico | Y |
| Garret | Sarkinen | Xcel Energy | Y |
| Rogerio | Verdolin | Verdolin Solutions | Y |
| Jason | Beaudoin | Weidmann | Y |
| Eduardo | García | Siemens Energy | Y |
| Luc | Loiselle | Tetra Tech | Y |
| Adriana | Cisco Sullberg | SRP | Y |
| Sebastian | Renhopf | Machinenfabrik Reinhausen | Y |
| Richard | Von Gemingen | Dominion Energy | Y |
| David | García Perales | Virginia Transformers | Y |
| Manen | Panelya | Siemens Energy | Y |
|  |  |  |  |
| Craig | Colopy | Retired from Eaton | N |
| Angela | Leigi | Eaton | N |
| Dan | Crockett | Ameren | N |
| David | Calitz | Siemens Energy | N |
| Roberto | Da Silva | Machinenfabrik Reinhausen | N |
| Tihomir | Pandza | Siemens Energy | N |
| Ponggki | Kim | Iljin Electric | N |
| Yonghui | Kim | Iljin Electric | N |
| Patrycja | Jarosz | IEEE SA | N |
| Besja | Pajaziti | Brochhaus Measurements | N |
| Chris | Franklin | MG Power Association | N |
| Gilberto | Garza | Prolec GE | N |
| Dragana | Gasic | Koncar | N |
| Janko | Pzodan | Koncar | N |
| Pedro | Pedro | Efacec | N |
| Mike | Craven | Qualus Power Service | N |
| Olivier | Uhlmann | RM Canada | N |
| Gerey | Suman | Electrical Technologies | N |
| Ali | Naderian | Enerparts | N |
| Kevin | Hampton | Siemens Energy | N |
| Stefan | Lembacher | Siemens Energy | N |
| Anton | Kashel | Delta Star | N |
| Ewald | Schweiger | Siemens Energy | N |
| Attila | Gyore | Midel & Midel Fluids | N |
| Park | Dean | Hyosung - HICO | N |
| Christopher | Johnson | Oncor | N |
| Andrew | Lugge | Hitachi Energy | N |
| Daniel | Obregon | TTE Transformers | N |
| Samuel | Brodeur | Hitachi Energy | N |
| Andrew | Steineman | Delta Star | N |
| Gerard | Paleo | Midel | N |
| Dan | Schwartz | Quality Switch | N |
| Paulo | Avelino | Hitachi Energy | N |
| Oscar | Mendiola | Transformer Protector Corporation | N |
| Drew | Welton | Intellirent | N |
| Paul | Salvato | intellirent | N |
| Samuel | Gruskicwitz | GE Vernova | N |
| Ronald | Hernandez | Doble | N |
| Samuel | Tekle | Weg Transformers USA | N |
| Alex | Zugher | Hitachi Energy | N |
| Jie | Zhang | CHINT | N |
| Mark | Tostrud | Dynamics Ratings | N |
| Pedro | Trujillo | Hyundai | N |
| Carlos | Hernandez | Delta Star | N |

**Attachment K.4.8**

A logo for a power and energy society

Description automatically generated **Task Force C57.140 Meeting**

**Fall 2024 Meeting**

Grand Ballroom E, St. Louis, MO

Monday, October 28th, 2024

3:15PM – 4:30 PM Central Time Zone

Chair: Sanjib Som Vice-Chair: Marcos Ferreira Secretary: Traci Hopkins

**TFC57.140 IEEE Guide for Evaluation and Reconditioning of Liquid Immersed Power Transformers**

**Fall 2024 IEEE Transformers Committee Meeting**

**St. Louis, MO, USA**

**28 October 2024**

**UNAPPROVED MINUTES**

**Chair: Sanjib Som – PTT**

**Vice-chair: Marcos Ferreira – Quanta Technology**

**Secretary: Traci Hopkins – H2scan**

**Meeting Start Time:** 1515

**SUMMARY:**

At 1515 on the afternoon of Monday 28 October 2024, the chair opened the meeting with an introduction and attendance. The sign-in sheet was distributed by the Secretary. The chair then reviewed the required IEEE policies and reviewed the Agenda and Minutes from the Spring 2024 meeting.

There was a Motion to Approve the Minutesfrom previous Spring 2024 meeting by Jeremiah Bradshaw and it was seconded by Joe White – **UNANIMOUS approval of minutes**. Then there was a review of the Agenda, there was a motion to approve the agenda by Ed teNyenhuis and it was seconded by Mickel Saad. This was passed unanimously.

There were 64 attendees in total. 13 of the 22 members were present, Quorum was Achieved. Member List is provided below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Role** | **First Name** | **Last Name** | **Company** |
| Chair | Sanjib | Som | PTT |
| Vice-chair | Marcos | Ferreira | Quanta Technologies |
| Secretary | Traci | Hopkins | H2scan |
| Member | Jeff | Benach | Megger |
| Member | Sanket | Bolar | Oncor |
| Member | Jeremiah | Bradshaw | Bureau of Reclamation |
| Member | Luiz | Cheim | Hitachi Energy |
| Member | Jesse | Duffy | Nashville Electric Service |
| Member | Zan | Kiparizoski | Howard Industries |
| Member | Emilio | Morales Cruz | Qualitrol |
| Member | Ryan | Musgrove | Oklahoma Gas and Electric |
| Member | Timothy C. | Raymond | Inductive Reasoning |
| Member | Scott | Reed | MVA |
| Member | Mickel | Saad | Hitachi Energy |
| Member | Brian | Sparling | Kinectrics |
| Member | Brad | Staley | Leeward Energy |
| Member | Shankar | Subramany | KEMA, Netherland |
| Member | Ed | teNyenhuis | Hitachi Energy |
| Member | Pragnesh | Vyas | Sunbelt Solomon |
| Member | Joe | White | Power Engineers |
| Member | Guang | Yuan | Hitachi Energy |
| Member | Kris | Zibert | ALLGEIER, MARTIN and ASSOCIATES, INC. |

The chair then opened discussions by reviewing Title, Scope and Purpose. Discussion began regarding the Scope and if it needed to be changed. There was discussion around the use of the words reconditioning and refurbishing. Jeremiah Bradshaw – USBR, noted that in C12.80 the word reconditioning was defined for the liquid insulation only. However, the word Refurbished was not. It was decided that “Refurbishing” would be defined in the revised C57.140 document and that part of the definition would include terminology such as “upgrades.”

After extensive discussion, there was a suggestion to change the Title and scope to:

**Title: IEEE Guide for Life Extension of Liquid Immersed Power Transformers and Reactors**

1. **Overview**
   1. **Scope**

**This document provides guidelines to assist the user in extending the useful life ofliquid-immersed Power Transformers and Reactors.**

A Motion to approve new Title & Scope and not to include Purpose by proposed by Mickel Saad and seconded by Tim Raymond. A vote was taken, and the approval was unanimous.

It was noted by **Marc Foata – Reinhausen** there is a CIGRE Document with the same Title and the new approved title. He also shared that CIGRE spent a lot of time discussing and defining “end of life.” And suggested we look at what they have already done and mentioned that CIGRE End of Life definitions are broken down into three categories:

1. Functional life
2. Economic life
3. Technical life

A final concern was presented by **Jeremiah Bradshaw USBR** to ensure that C57.140, C57.170 & C57.637 chairs coordinate with each other to clearly understand the purpose of each document. **Sanjib Com, Chair,** will raise this with Subcommittee Chair.

The meeting was adjourned at 1615. Below is a list of attendees for the St. Louis meeting. The task forced achieved the task assigned in two meetings.

Attendee List for Fall 2024 Meeting:

|  |  |  |  |
| --- | --- | --- | --- |
| **Role** | **First Name** | **Last Name** | **Company** |
| Guest | Paul | Boman | HSB |
| Member | Jeremiah | Bradshaw | Bureau of Reclamation |
| Guest | Wilerson | Calil | Hitachi Energy |
| Guest | Edward | Casserly | Ergon |
| Member | Luiz | Cheim | Hitachi Energy |
| Guest | David | Cordova | Maddox Industrial Transformer |
| Guest | Eric | Doak | DY Energy Solutions |
| Member | Jesse | Duffy | Nashville Electric Service |
| Guest | Evgenii | Ermakov | Hitachi Energy |
| Guest | Zlatan | Fazlic | Camlin Energy |
| Vice-chair | Marcos | Ferreira | Quanta Technologies |
| Guest | Mark | Finn | Hitachi Energy |
| Guest | Marc | Foata | Reinhausen |
| Guest | Peng | Fu | Chint Global |
| Guest | Eduardo | Garcia | Siemens |
| Guest | James | Gardner | Prolec-GE Waukesha |
| Guest | Jose Antonio | Gonzalez Ceballos | GA Transformers |
| Guest | Brad | Greaves | Weidmann Group |
| Guest | Brad | Grooms | NTS |
| Guest | Ismail | Guner | Hydro Quebec |
| Guest | Niklas | Gustavsson | Hitachi Energy |
| Guest | Roger | Hayes | GE |
| Guest | William | Herron | US Reinhaussen |
| Guest | Thang | Ho | BC Hydro |
| Guest | Derek | Hollrah | Burns & McDonnell |
| Secretary | Traci | Hopkins | H2scan |
| Guest | Ryan | Jonak | PGE |
| Guest | Braxton | Jones | SD Myers |
| Guest | Kurt | Kaineder | Trench Group |
| Guest | Thrinadha | Katapalli | VA Transformers |
| Guest | Mathieu | Lachance | Omicron Energy |
| Guest | Don | Lamontague | Arizona Public Service |
| Guest | Tiffany | Lucas | PROLEC |
| Guest | Jose Luis | Machain | Prolec GE |
| Guest | Jinesh | Malde | MIDEL |
| Guest | Kumar | Mani | Duke Energy |
| Guest | Balakrishnan | Mani | Delta Star FS |
| Guest | Moses | Manzano | Hyosung Hico |
| Guest | Mohammed | Megdad | IPS |
| Guest | Toni | Mellin | Vaisala |
| Guest | Robert | Mennonna | Maddox Industrial Transformer |
| Member | Emilio | Morales Cruz | Qualitrol |
| Guest | Anastasia | O'Malley | Con Edison NY |
| Guest | Cuauhtemor | Ortiz | Niagara Power |
| Guest | Parminder | Panesar | VA Transformers |
| Guest | John | Pruente | APC Construction |
| Member | Timothy C. | Raymond | Inductive Reasoning |
| Member | Scott | Reed | MVA |
| Guest | Patrick | Rock | ATC |
| Member | Mickel | Saad | Hitachi Energy |
| Guest | Alfonso | Schrammel | Siemens-Energy |
| Guest\* | John | Sinclair | Black & Veatch |
| Chair | Sanjib | Som | PTT |
| Member | Brian | Sparling | Kinectrics |
| Guest | Greg | Steeves | Baron USA |
| Guest | Marc | Taylor | JFESHOJI Power |
| Member | Ed | teNyenhuis | Hitachi Energy |
| Guest | Jim | Thompson | T&R Service Company |
| Guest | Alvyn | Vanderwalt | ECI |
| Guest | Joshua | Watson | NPPD |
| Member | Joe | White | Power Engineers |
| Guest | Elliot | White | SD Myers |
| Guest | Deanna | Woods | Prolec GE Waukesha |
| Guest | Jeffrey | Wright | Duquesne Light |

**Minutes:**

1515 called to order

Reviewed: patents, Participant behavior, Copy-wright policy

Reviewed Member list

**Quorum**: 13 of 21members Quorum **achieved**

Review of minutes sent from last meeting:

**Motion To Approve Minutes** from previous Spring 2024 meeting: Jeremiah Bradshaw, seconded Joe White – **UNANIMOUS approval of minutes**

Review of Agenda:

**Motion to approve agenda:** Ed teNyenhuis, seconded Mickel Saad

**Review & Discussion of Title, Scope & Purpose:**

**Brian Sparling – Kinectrics** **– Scope:** Is this truly for Mineral Oil only or should we be talking about other insulating liquid types?

Suggests: changing scope to align with title

**Scott Reed-MVA**: is reclaiming part of this it is already in 637…need clear delineation of this guide and 637. Suggest keep scope broad to “liquid maintenance & diagnostics”

**Ed teNyenhuis – Hitachi Energy:** include cooling in the scope

**Jim Thompson-T&R Service Company:** C57.637 is detailed on methods and tied into c57.106 – previous C57.140 references C57.637 & C57.106.

**Marcos Ferreira – Luma:** 637 covers alternate liquids.

**Thrinadha Katapalli – VA Transformer:** loss of life – are we talking about returning to nameplate rating

**Sanjib Som - Chair:** loss of life – not listed

**Jerimiah Bradshaw USBR** – tech editor of 637 is for all liquid items – remove all liquid items and point to 637, 140 should be for xfmrs remove all liquid and diagnostics from here and point to 637 for appropriate reclamation

**Kumar Mani – Duke Energy:** say insulation life or condition

Jeff Thompson: another guide that combines all liquids is this just for mineral oil?

**Sanjib Som- Chair:** hearing from the TF this doc should be expanded to include alternate liquids

**Tim Raymond – Inductive Reasoning:** biggest challenge with Scope & Purpose of this doc is a lot of this material has been cannibalized by other documents. What can we strike as parts are covered elsewhere…focus is the reconditioning (Life extension). Reword scope to focus on the reconditioning component.

**Jeremiah Bradshaw - USBR:** 170 condition assessment of liquid xfmrs. 140 should focus on the extension of life.

**Suggests the Scope should read:**

This document provides guidelines to assist the user in extending the useful life of a transformer.

**Mickel Saad:** add through reconditioning and refurbishing to scope

**Jeremiah:** reconditioning and refurbishing are in the purpose. What about upgrading?

**Kumar:** also include repair.

**Jeff T.:** thinks this should be enough:

This document provides guidelines to assist the user in extending the useful life of a transformer through repairing, reconditioning, or refurbishment.

**Tim:** are we limiting this to Field activities?

**Jeremiah:** refurbishment includes repair. To bring to “like new” need to include upgrades.

**Sanjib:** Is refurbishment defined in C12.80, if not then we need to add to the definitions.

**Decision made to define the word refurbishment in revision of C57.140.**

**The word refurbishment to be defined to include “upgrades.”**

**Marcos F.:** assess the xfmr is it beyond repair in the field? Need guide to address should we repair or put out of service?

**Brian S:** Getting into economics…cannot do this.

**Jeremiah:** reconditioning is in 12.80 – definitely in 637 need different name…suggestion is Refurbishment

**UNKNOWN:** clarifying the 12.80 definition f reconditioning

**Jinesh:** retrofilling – refurbishing

**TIM:** need to be careful with 12.80

**KURT:** Likes broad definition of SCOPE. Add reactors too.

**Mickel S.:** Evaluation includes Risk Assessment which is in another guide…170…GUIDE FOR REFURBISH MENT

**Ed T.:** **Suggested title read:**

IEEE GUIDE FOR LIFE EXTENSION OF LIQUID IMMERSED POWER TRANSFORMERS AND REACTORS

**KUMAR:** Scope – need to add word, **suggested:**

This document provides guidelines to assist the user in extending the useful life of a liquid-immersed Power transformer and Reactors.

**Marc Foata – Reinhausen:** Observed new proposed Title is same as CIGRE Document: advised that CIGRE spent a lot of time discussing and defining “end of life.” Suggested we take a look at what they have already don… CIGRE End of Life broken down into three categories:

1. Functional life
2. Economic life
3. Technical life

**Proposal of New Title and Scope to:**

**Title: IEEE Guide for Life Extension of Liquid Immersed Power Transformers and Reactors**

1. **Overview**
   1. **Scope**

This document provides guidelines to assist the user in extending the useful life ofliquid-immersed Power Transformers and Reactors.

**Motion to approve new Title & Scope and not to include Purpose:** Mickel Saad, seconded Tim Raymond…unanimous.

**Approved New Title & Scope and decided to not include Purpose**

Final Note:

**Jeremiah Bradshaw USBR:** make sure C57.140, C57.170 & C57.637 chairs coordinate with each other to clearly understand the purpose of each document…needs coordinated. Sanjib to raise this with Subcommittee Chair.

**Meeting Adjourned: 1615**

**Attachment K.4.9**

**Power Transformers Subcommittee**

**Working Group Report**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Document #:** | | **C57.125** | | | |
| **Document Title:** | | **Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors** | | | |
| **Chair:** | **Hakan Sahin** | | **Vice-Chair** | **Thomas Melle** |
| **Secretary** | **Adam Sewell** | | **Percent Complete** | **75%** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Current Draft Being Worked On:** | **1.0** | **Dated:** | **n/a** |
| **PAR Expiration Date:** | **December 31, 2025** |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Meeting Date:** | **10/28/2024** | **Time:** | **4:45pm – 6:00pm** |
| **Location:** | **St. Louis, MO, USA** |  |  |

|  |  |  |
| --- | --- | --- |
| **Attendance:** | **Members** | **26 of 41** |
|  | **Guests** | **71** |
|  | **Guests Requesting Membership** | **13** |
|  | **Total**\* | **97** |
| **\* Attendance list for this meeting is shown at end of meeting minutes** | | | |

**Meeting Minutes / Significant Issues / Comments:**

Meeting was called to order at 4:45pm, October 28, 2024 at Hyatt Regency St. Louis at The Arch.

1. Administrative
   1. IEEE Patent Policy and Call for Patents
      1. No comments from group
   2. IEEE SA Copyright Policy
      1. No comments from group
   3. Review of agenda
      1. No comments from group
   4. Reminder on the purpose and the scope of the working group, and the timeline
      1. The expectation from this WG is to review and update the document as it expires on 12/31/2025.
      2. Projected Completion Date for Submittal to RevCom: Dec 2024
   5. Introductions of the attendees
      1. Attendance sheets were passed out. Name/affiliation was announced as attendees spoke during the meeting.
      2. Secretary asked all who wanted on email distribution for the C57.125 Working Group to send him an email at: adamsewell@ieee.org
   6. Updated membership review and count for quorum
      1. 41 members and 24 were counted as present via hand count.
         1. QUORUM ACHIEVED
      2. *Attendance sheets after meeting completed showed 26 members attended*.
      3. Members are expected to attend and stay in the meeting so business can be conducted.
   7. Approvals of previous minutes and agenda:
      1. Approval of the agenda for Fall 2024
      2. Approval of the Spring 2024 unapproved meeting minutes
      3. MOTION to approve agenda/minutes – R.Verdolin, 2nd – S.Chambers
         1. No objection to unanimous approval – ALL APPROVED
2. Old Business
   1. Review of the online voting results and comments on Section 4.2 – Flowchart, and re-vote.
      1. 19/41 members responded, with all approved, or approved with comments. Below are the comments with approval votes:
         1. Hakim Dulac: I would keep the DP testing before scraping. Or at least suggest or make it optional.
         2. Zachary Draper: I kind of wish there was a box right before "SCRAP", that said "Consider performing a methodical tear-down investigation." Then a transformer owner doesn't immediately send for scrap, but considers trying to learn from the experience by having a slower tear-down process (before the Jawas get their hands on it), where they take photographs of key internal components, things perhaps not visible from an internal inspection when it is still in its tank. Something optional of course, but it gives the hint that something can still be learned from it.  Especially when you performed all the tests leading up to that point, it would be nice to have the "smoking gun" photograph, or even to find nothing.
      2. MOTION to approve changes to Section 4.2-Flowchart as presented – S.Chambers, 2nd – S. Som
         1. After some discussion, a vote was called
         2. 23 – APPROVE, 1 – Abstain – MOTION PASSES
   2. Review of the online voting results and comments on Table-8 – Internal inspection of the main tank, and re-vote
      1. 19/41 members responded, 18 approved or approved with comments, 1 abstain. We need to vote again during this meeting (Pending quorum). Below is the only comment with approval vote:
         1. Hakim Dulac: I would keep “Evidence of low insulating liquid level inside tank” in the Condition of Core section.
      2. MOTION to approve changes to Table 8 as shown – W.Binder, 2nd – R.Musgrove
         1. After some discussion an amended MOTION was made to approve changes to Table 8 as shown but keep the words “Lead clamping” – T.Raymond, 2nd – S.Chambers
         2. Vote on the Amended MOTION to approve changes to Table 8 as shown but keep the words “Lead clamping” was taken
            1. 21 APPROVE, 4 Abstain – MOTION PASSES
3. New Business
   1. Officers will work on getting Draft 1 created using all the approved changes from previous meetings and will send out to the Working Group.
   2. From Enrique Betancourt – warning related to stakeholders
      1. I wanted to look at the Draft document because I think there is a paragraph missing with some warning related to stakeholders who must approve and even witness the investigation process. When the transformer is under warranty from the manufacturer, and or there is an insurance company to be claimed about the event, they may also request some preliminary steps, before starting with the technical part of the investigation process recommended in the Guide.
      2. MOTION to review the stakeholders in the document – E.Betancourt, 2nd-E.Garcia Wild
         1. After some discussion, E.Betancourt WITHDREW this MOTION.
4. Membership changes
   1. Officers will look at attendance of members and member requests to make changes to WG membership list before the Spring 2025 meeting.
5. Next meeting: March 2025 in Denver, CO, USA.
6. Close of meeting
   1. Meeting adjourned at 6:00pm

Submitted by: Hakan Sahin Date: 11/15/24

**October 28, 2024 Meeting Attendance (RM = Request Membership):**



**Attachment K.4.10**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Power Transformers Subcommittee**  **Working Group Report**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Document #:** | | **C57.157** | | | | | **Document Title:** | | **Guide for Conducting Functional Life Tests on Switch Contacts Used in**  **Insulating Liquid-Immersed Transformers** | | | | | **Chair:** | | **Adam M. Sewell** | | **Vice-Chair** | **N/A** | | **Secretary** | | **Piotr Blaszczyk** | | **Percent Complete** | **N/A** |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Current Draft Being Worked On:** | **N/A** | **Dated:** | | **N/A** | | **PAR Expiration Date:** | **PAR expires 12/31/2027**  **Std expires 12/31/2025** | |  |  |  |  |  |  |  | | --- | --- | --- | --- | | **Meeting Date:** | **29 March 2024** | **Time:** | **8:00am-9:15am** | | **Location:** | **St. Louis, MO, USA** |  |  |  |  |  |  | | --- | --- | --- | | **Attendance:** | **Members** | **10 of 18** | |  | **Guests** | **27** | |  | **Guests Requesting Membership** | **1** | |  | **Total**\* | **37** | | **\* Attendance list for this meeting is shown at end of meeting minutes** | | | |   **Meeting Minutes / Significant Issues / Comments:**   1. Meeting was called to order at 8:00am, October 29, 2024 at Hyatt Regency St. Louis at The Arch- Grand Ballroom C (4th Floor). 2. Presentation of Agenda 3. Presentation of IEEE Standards Slides    1. Call for Patent Claims & Copyright Notice    2. No comments from working group about any patent claims or copyright notice 4. Distribution of attendance sheets    1. Please send an email to [adamsewell@ieee.org](mailto:adamsewell@ieee.org) with the subject: C57.157 EMAIL to be added to the C57.157 email list 5. Checking the Quorum – 18 members so 10 needed for quorum.    1. 10 out of 18 members were in attendance of the meeting so quorum was achieved. 6. Approval of the Meeting Minutes from Spring 2024 and Fall 2024 Agenda.    1. MOTION was made by D.Schwartz and 2nd by J.Sewell to approve Meeting Minutes from Spring 2024 and Fall 2024 Agenda.    2. No opposition to unanimous approval of the MOTION - APPROVED 7. Chair announcements    1. Current guide is set to expire December 31, 2025    2. This group was to determine work needed for this standard and create a PAR for revision if needed. Par was created after the Spring 2023 meeting and has PAR Approval Date of 05 Jun 2023 and expiration of 31 Dec 2027. 8. Old work    1. Request was made to share previous presentations that were used to develop this guide       1. Chair posted previous presentations and 2015 C57.157 standard on IEEE Collabratec and IEEE TC Power Transformer Subcommittee pages       2. Chair presented background information on this guide during the meeting by showing one of the presentations that is available on IEEE Collabratec.    2. Members of this group were tasked to review current guide and previous presentations before Spring 2024 meeting and make suggestions as to what recommendations they have for this guide    3. Presentation was made by F. Faur of his observations of the current guide:   ***Summary***  The purpose of the test described in C57.157 is to verify if the contacts of a tap changer would perform adequately over 30 years of its life.  The test makes the simplification hypothesis that the contact life depends on the thermal runaway due to the increased resistance of the contact points. The main conclusion after this test is that Ag-Ag contacts perform better than any other combination, and Sn plated contacts perform the worst.  While this is true, it is not the only practical option to mitigate the problem of overheating, and not the only cause of overheating. Also, the number of other causes that can trigger a contact failure is so high, that performing the test in every condition is impractical. Having passed the test in one configuration doesn’t guarantee that the same contact or even switch will pass the test in another configuration.  ***Comments*** (in the comments below, when I mention contact, I am referring to the entire body of a stationary or a moving contact, as opposed to the contact point as the sum of A-spots between 2 contacts)   1. Trapped hot oil Sometimes, either the tap changer manufacturer or the transformer manufacturer adds extra barriers to increase dielectric strength. In this case, the hot oil created by the contact would keep overheating, accelerating the contact failure. 2. Different coefficient of thermal expansion A long moving contact that operates close to its thermal capabilities, would thermally expand differently than the insulating material that separates the stationary contacts. That makes the contact points move slightly every time the temperature changes. Each time the contact moves, it breaks new areas of oxidation that accumulate around the contact points, increasing the electrical resistance and preventing oil cooling. The longer the contacts, the more predominant is this phenomenon. 3. Number of cycles The test exclusively assesses the deleterious effects of the contacts' prolonged exposure to high temperatures, disregarding the cycle count in a heavy-duty switch application. In some of the documentation from the time the test was developed, it was *observed that most failures were in peaking, pulsing loads: Rectifier Loads, Motor Starting Loads, Furnace Supplies, or Emergency Generator Transformers*. No failures were observed *in utility transformers or units that had more “homogenized” loads*. That means that an increased number of cycles might be more important than the current, temperature, and time itself. 4. Operating the tap changer If a contact point is Ag-Cu, then, by operating it several times, part of the silver from AG contacts is smeared over the blank Cu contact. For this reason, pure Ag-Cu contacts don’t exist. 5. Oil properties Transformer oil can have different properties that affect contact cooling, gas generation, coke formation, etc. The transformer manufacturer decides what oil to use. I am not referring to structural differences like mineral vs. ester vs. silicone oils. I am referring to subtle differences like additives in the oil, inhibited vs. non-inhibited oil, etc. All those small changes may, among other things, affect oil thermal breakdown and the formation of film deposits and increase contact point resistance. 6. Spring force Sometimes the springs in the contacts lose their compression force in a longer time than the 30 days of testing, leading to contact failure. The test would pass a contact that would fail in the real world with the same symptoms. 7. Insufficient contact section The heat generated by the contact point itself couldn’t be eliminated properly. Sometimes, just increasing the cross-section of the contact could solve the heat problem. 8. Cable & Cable lug heat sink The section of the cables and cable lugs and the insulation over the cable affect the elimination of heat from the contacts, or they can even contribute to heating the contacts. 9. Water, gases, and contaminants The test doesn’t address the possible presence of water or gases in oil and their effect on the oxidation and aging of the oil. Those can affect the behavior of contacts at elevated temperatures more than the temperature itself. 10. Oxygen concentration The oil behaves differently if the tank is sealed, has a nitrogen blanket, has a conservator, or is free breathing.   From the above observation, I think that this test has a similar kind of performance prediction ability to the standard temperature rise test from C57.131, but using more harsh conditions (longer test and higher temperature).  Slightly related to the above, in the standard C57.131 I think that it would be beneficial if we could add some comments about the testing conditions: the amount of oil, distance to the walls and oil surface, the length of cables in the oil, the thermal insulation of the tank, dielectric barriers, etc.   1. New Work    1. T. Tillery and P. Hopkinson brought up looking at synthetic esters for use in this guide in Kansas City Fall 2023 meeting.       1. Chair has requested a presenter/presentation to give at a future meeting from a synthetic ester producer. No presentation was ready for Vancouver meeting so plan on having a presenter/presentation for Fall 2024 St. Louis meeting.    2. Attila Gyore (Midel) presented at the meeting on topic of synthetic esters       1. History of synthetic ester liquids       2. Chemistry of synthetic ester liquid and how is it different to mineral oil and natural ester liquids       3. Standards that apply to synthetic ester liquid (IEEE, ASTM and IEC)       4. Material compatibility 2. Next meeting: March 25, 2025 at Spring 2025 Transformers Committee Meeting scheduled for March 23-27, Denver, CO, USA. 3. Close of meeting    1. Meeting adjourned at 8:55am   Submitted by: Adam Sewell Date: November 5, 2024  **Meeting Attendance October 29, 2024 (RM = Request Membership):** |  |

**Attachment K.4.11**

**IEEE TC MEETING Minutes**

**Working Group PC57.170**

**Condition Assessment Guide**

**October 29, 2024**

**9:30 AM – 10:45 AM (CST)**

**Hyatt Regency, St. Louis, Missouri, Conference Room: Grand Ballroom D (4)**

|  |  |  |
| --- | --- | --- |
| ***Chair****:* Kumar Mani | ***Vice-Chair****:* James Cross (Not Present) | ***Secretary****:* Akash Joshi |

1. Call to Order
   1. Chair’s Remarks
   2. IEEE-SA Policies, including Essential Patent Policy Reviewed
   3. Copyright Policy Reviewed
   4. A quorum was established with 35 of 62 members being present. There was a total of 95 attendees.
2. Fall 2024 Meeting Agenda Review and Approval. Reviewed and approved without any objections or abstentions.
   1. Motion Moved by Marcos Ferreira.
   2. Seconded by Scott Reed.
   3. Motion was approved unanimously.
3. Approval of Spring 2024 Vancouver Meeting Minutes of the Previous meeting, No objections, or abstentions.
   1. Motion Moved by William Whitehead.
   2. Seconded by Jeremiah Bradshaw.
   3. Motion was approved unanimously.
4. PC57.170 Guide Progress
   1. The chair provided an update on the initial ballot circulation- we received an 80% response and 91% approval rate with 171 comments.
   2. Saramma Hoffman, the CRG Team Lead provided an update on comment resolution -

a total of 172 Comments were received with 37 being of technical nature and the remaining 135 editorial. The Team met twice after the ballot and has resolved 17 technical comments so far. It is planned to resolve the remaining comments by Dec 31, 2024.

* 1. The Chair remarked that the guide will be sent out for a recirculation ballot after the comment resolution process is completed. The PAR for the guide expires on Dec 31, 2025.
  2. Marcus Ferreira suggested collaboration with the C57.140 guide PAR Team to avoid the duplicating details about OLTC maintenance between that guide and the C57.170 guide. Jeremiah suggested we discuss overlap topics between the two guides at the next meeting. Weijun Li and Ryan Musgrove then clarified that as per current rules, no new topic can be introduced now that the guide is in ballot stage while the CRG is resolving it and that new topics can now be added only in the next revision cycle.

The Chair and Brian Sparling remarked that chapters in the guide draft were written after mapping out the contents of other existing guides like C57.140 and C57.93 and there should be overlap.

* 1. Thomas A Keels requested a draft copy of the guide. Since he is not a member of the working group currently, he cannot be provided with a copy of it.

1. Next meeting will be held at Denver, Colorado between March 23-27, 2025.
2. Meeting was adjourned after no new items were discussed.

Attendee List:

|  |  |  |  |
| --- | --- | --- | --- |
| PC57.170 Condition Assessment Fall-2024 Attendance | | | |
| **First Name** | **Last Name** | **Company** | **WG Member/Guest** |
| Daniel | Aleusandrowicz | Hitachi Energy | G |
| Robert | Allison | Dominion Energy | G |
| Orlando | Benitez | Hyosung HICO | G |
| Enrique | Betancourt | Prolec GE | M |
| William | Boettger | Boettger Transformer Consulting LLC | M |
| Sanket | Bolar | Oncor Electric Delivery | M |
| Paul | Boman | Hartford Steam Boiler | G |
| Mike | Bonn | Soltex | G |
| Jeremiah | Bradshaw | Bureau of Reclamation | M |
| Samuel | Brodeur | Hitachi Energy | G |
| Wilerson | Calil | Hitachi energy | G |
| Alonso | Castilo | Kaedi energy | G |
| Stuart | Chambers | EPRI | G |
| Luiz | Cheim | Hitachi Energy | M |
| Roberto | Da Silva | MR Reinhausen | G |
| Thomas | Dauzat | AEP-SEPCO | G |
| Eric | Doak | D4EnergySolutions LLC | G |
| Jesse | Duffy | Nashville Electric Service | M |
| William | Elliott | AEP | G |
| Evgenii | Ermakov | Hitachi Energy | M |
| Marco | Espindola | Hitachi Energy | M |
| Florin | Faur | Prolec GE Waukesha | G |
| Zlatan | Fazlic | Camlin Power | G |
| Todd | Felton | Not Avaialble | G |
| Marcos | Ferreira | Quanta Techno | M |
| Mark | Finn | Hitachi energy | G |
| Jose Antonio | G | Georgia Transformer | G |
| Eduardo | Garcia Wild | Siemens Energy | M |
| James | Gardner | Prolec GE Waukesha | G |
| Joshua | Garner | Independent Dielectrics | G |
| Ismail | Guner | Hydro-Quebec | M |
| Attila | Gyore | Midel M&I | M |
| Roger | Hayes | General Electric | G |
| Kyle | Heiden | EATON Corporation | G |
| Jean | Hernandez | Georgia tech | G |
| Ronald | Hernondez | Doble Engineering Co. | G |
| Bill | Herron | Reinhausen | G |
| Thang | Hochanh | BC Hydro | G |
| Saramma | Hoffman | PPL Electric Utilities | M |
| Derek | Hollrah | Burns & McDonnell | G |
| Traci | Hopkins | h2Scan | G |
| Christopher | Jhonson | Oncor Electric Delivery | G |
| Ryan | Jonak | PG&E | G |
| Braxton | Jones | SD Myers | G |
| Akash | Joshi | Black & Veatch | M |
| Jerzy | Kaznierezah | Hitachi Energy | G |
| Thomas | Keels | KE Electric Engineering PLLC | G |
| Bob | Kelley | Nass | G |
| Rafal | Kowlaski | Hitachi Energy | G |
| Donald | Lamontagne | Arizona Public Service Co. | G |
| Weijun | Li | Braintree Electric Light Dept. | M |
| Andrew | Logge | Hitachi Energy | G |
| Luc | Loiselle | Tetra Tech | G |
| Tiffany | Lucas | Prolec GE Waukesha | G |
| Stephanie | Mabrey | AVO Diagnostics | M |
| Balakrishnan | Mani | Delta start | G |
| Kumar | Mani | Duke Energy | M |
| Toni | Mellin | Vaisala | G |
| Emilio | Morales-Cruz | Qualitrol Company LLC | M |
| Ryan | Musgrove | OG&E | G |
| Mark | Newbill | Hitachi Energy | G |
| Mike | Nolte | Kiewit | G |
| Shane | Oakley | NASS | G |
| Poorvi | Patel | Electric Power Research Institute (EPRI) | M |
| Timothy | Raymond | Inductive Reasoning | M |
| Scott | Reed | MVA | M |
| Diego | Robalino | Megger | G |
| Mickel | Saad | Hitachi Energy | M |
| Amitabh | Sarkar | Virginia Transformer Corp. | M |
| Alaor | Scardozzi | Siemens Energy | G |
| Hemchandra | Shertukde | University of Hartford | M |
| Jonathan | Sinclair | Black & Veatch | M |
| Brian | Sparling | Dynamic Ratings, Inc. | M |
| Andy | Speegle | Entergy | G |
| Brad | Staley | Leeward renewable energy | M |
| Charles | Sweetser | OMICRON electronics Corp USA | M |
| Ed | TeNyenhuis | Hitachi energy | M |
| Olivier | Uhlmann | Reinhausen Canada Inc. | G |
| Alwin | Van Der Walt | Electrical Consultants, Inc. | G |
| Rogerio | Verdolin | Verdolin Solutions Inc. | G |
| Dharam | Vir | GE Prolec | M |
| Alan | Washburn | Burns & McDonnell | M |
| Joshua | Watson | NPPD | G |
| Matthew | Webb | GE Prolec | G |
| Drew | Welton | Intellirent | G |
| Elliot | White | SD Myers | G |
| Joe | White | Power engineers | G |
| William | Whitehead | H2scan Corporation | M |
| Trenton | Williams | Advanced Power Technologies | M |
| Jeffrey | Wright | Duquesne Light Co. | M |
| Shazhan | Xu | FM global | G |
| Koray | Yavuz | Noark Electric | G |
| Guang | Yuan | Hitachi Energy | G |
| Joshua | Yun | Virginia Transformer | M |
| Zhu | Zhinoiang | Chint Transformers | G |

**Attachment K.4.13**

**Working Group Meeting for IEEE Standard PC57.17**

St. Louis, Missouri, USA Meeting – October 29, 2024 11:00-12:15 pm CST

Chair: Dom Corsi

Secretary: Jason Varnell

1. The meeting was called to order at 11:00 AM CST.
2. There were 34 active participants present, which consisted of 13 of the 21 members. Quorum was achieved.
3. Two (2) participants requested membership and both were granted membership due to attendance. One member requested to be moved to guest. Therefore, the new membership total after the F24 meeting is 22.
4. The chair reviewed the IEEE patent slides and the group made no patent claims.
5. The chair reviewed the copyright policy with the group.
6. A motion was made by Jason Beaudoin (Weidmann) and seconded by Trenton Williams (Advanced Power Technologies) to approve the Fall 2024 meeting agenda. There were no objections to unanimous approval of the agenda. A motion was made by Jason Beaudoin (Weidmann) and seconded by Trenton Williams (Advanced Power Technologies) to approve the Spring 2024 Vancouver, BC Working group meeting minutes. There were no objections to unanimous approval of the Spring 2024 Vancouver, BC working group meeting minutes.
7. **Old Business:** The chair reviewed changes that were incorporated into the D1.1 draft after the S24 meeting.
8. **Old Business:** May 31, 2024 straw ballot:
   1. Only two sub-groups submitted comments to the straw ballot, it was agreed by the working group to resubmit the straw ballot with increased focus to obtain responses prior to the S25 meeting.
   2. One comment requested to increase the insulation levels in clause 5 to include 115kV; however, it was decided by the WG to not include 115kV in clause 5 but it was noted that the scope of the standard was previously revised to remove restrictions to limit the standard to 69kV class. This will be old business in the S25 WG meeting.
   3. One comment requested to increase the kVA rating from 100,000 kVA to 300,000 kVA in Subclause 4.2. The commenter was not at the WG meeting and the WG wanted more information before agreeing to make the change. This will be old business in the S25 WG meeting.
   4. One comment requested to increase the typical impedance range from 4.0 % – 5.5 % to 8.0 % - 10.0 % in subclause 6.1. The commenter was not at the WG meeting and the WG wanted more information before agreeing to make the change. This will be old business in the S25 WG meeting.
   5. The straw ballot comments were reviewed and the following changes were agreed to be incorporated in Draft D1.2
      1. Editorial change to Annex A to add the word “transformer.”
      2. Add a note to subclause 4.4.
         1. “Note: This is to protect the LV windings from over current if the wye connected HV windings were operated at design current levels.”
      3. Add text to subclause 8.1 to state that additional losses may be generated in and from the shorting bars and risers during load loss measurement and an allowance for a loss correction method should be agreed upon between manufacturer and purchaser at the bid stage. Additionally, agreement should be made if less than rated current will be used for loss measurement.
      4. Add text to subclause 8.2 to state that fiber optic probes may be used to determine winding temperature rise when agreed upon between the manufacturer and purchaser at the bid stage.
      5. Add requirement to subclause 8.6 that arc furnace transformers with series reactors built in the same tank as the main transformer should be tested for linearity up to 200 % rated current.
   6. Draft D1.2 will be sent out for straw ballot prior to the S25 WG meeting.
9. **New Business:** The chair, Dom Corsi, announced that he is stepping down from the chair position and that Jason Varnell (Doble Engineering) will transition from secretary to chair. William Herron (Reinhausen) will be vice-chair and Trenton Williams (Advanced Power Technologies) will be secretary.
10. The next working group meeting will be in Denver, Colorado, USA during the Spring 2025 Transformers Committee Meeting.
11. The meeting adjourned at 12:00 PM CST.

**Attendance Record:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Status as of 10/30/2024 (After F24 Meeting)** | **Last Name** | **First Name** | **Affiliation** |
| Member | BARGONE | GILLES | FISO |
| Guest | BETANCOURT | EDWIN | SIEMENS ENERGY |
| Member | BEAUDOIN | JASON | WEIDMANN |
| Member | BOETTGER | WILLIAM | BOETTGER TRANSFOMER CONSULTING LLC |
| Guest | COLOPY | CRAIG | CONSULTANT |
| Guest | CORSI | DOMENICO | Doble Engineering Co. |
| Guest | DOAK | ERIC | D4ENERGY SOLUTIONS |
| Member | GORZIN | ALIREZA | BLACK & VEATCH |
| Guest | GRIESACKER | BILL | WILLIAM GRIESACKER AND ASSOC. |
| VICE-CHAIR | HERRON | WILLIAM | REINHAUSEN |
| Guest | JIE | ZHANG | CHINT HEEVIE CO. LTD |
| Guest | JUNG | FRANCISCO | REINHAUSEN |
| Guest | KELLEY | BOB | NASS |
| Member | KENNEDY | SHELDON | SHELDON KENNEDY ENGINEERING PLLC |
| Guest | LABH | ASHWINI | HITACHI ENERGY |
| Guest | LUGGE | ANDREW | HITACHI ENERGY |
| Guest | MARTINEZ | DANIEL | JFE CANADA |
| Guest | MENDEZ | OMAR | PROLEC-GE |
| Member | MORALES-CRUZ | EMILIO | QUALITROL |
| Guest | MURCIA | FREDY | SIEMENS ENERGY |
| Member | MUSGROVE | RYAN | [OG&E](mailto:OG@E) |
| Member | NEWBILL | MARK | HITACHI ENERGY |
| Guest | PREVOST | THOMAS | WEIDMANN |
| Member | SAUER | DAN | EATON |
| Member | SOM | SANJIB | PTTI |
| Guest | SPARLING | BRIAN | KINECTRICS |
| Guest | SWARNA | SUNNY | VIRIGINA TRANSFORMER |
| Guest | TENYENHAUS | EDWIN | HITACHI ENERGY |
| CHAIR | VARNELL | JASON | Doble Engineering Co. |
| SECRETARY | WILLIAMS | TRENTON | ADVANCED POWER TECHNOLOGY |
| Member | WHITTEN | CHRISTOPHER | HITACHI ENERGY |
| Guest | YAVUZ | KORAY | NOARK ELECTRIC |
| Member | XU | SHUSHEN | FM GLOBAL |
| Guest | ZEIGHER | ALEX | HITACHI ENERGY |

**Attachment K.4.15**

Working Group – 60076-57-1202

Chair: Ewald Schweiger

**60076-57-1202   
IEC/IEEE International Standard Power Transformers Part 57-1202:   
Liquid immersed phase-shifting transformers**

1. Meeting started at 1:45 PM (CDT) on Tuesday October 29th.
2. This was the first meeting as WG (Working Group).

* Attendance: 48
* Members: 11
* Guests: 37

1. A brief overview about the previous meetings of 60067-57-1202 was presented:

* Kansas City F23: Started a Study Group for the 60076-57-1202 IEC/IEEE Standard of Liquid immersed Phase-Shifting Transformers.
* The objective: To provide the Power Transformers Subcommittee (PTSC) with a recommendation whether the document needs revision.
* Vancouver S24: PTSC approved the title & scope of PAR.
* Virtual 07/24: Finalized wording for PAR (Need for the project)
* PAR approved on September 26th by IEEE SA Standard Board
* 🡪 1st meeting as **W**orking **G**roup here in St Louis

1. Call for patents & Copyright statement
   * 1. The slides on essential patents from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.  
         🡪 No essential patents or issues were reported.
     2. The slides on IEEE copyright policy from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.  
        🡪 No issues were reported.
2. Establish quorum
   * A quorum was achieved.
   * Total number of members is 14 requiring 8 members for quorum.
   * 11 members were present establishing quorum.
3. Approval of agenda
4. Motion to approve agenda was made by Joe Watson and seconded by Alfons Schrammel.  
   No discussion or objections were made.
5. Motion was carried unanimously with no objections or abstentions.
6. Approval of meeting minutes of the previous Virtual meeting on July 24th, 2024 via Webex
7. The Meeting Minutes were posted on the [PTRC website](https://www.transformerscommittee.org/subcommittees/powertransf/#:~:text=C57.135%20%E2%80%93%20IEEE%20Guide%20for%20the%20Application%2C%20Specification%20and%20Testing%20of%20Phase%2DShifting%20Transformers).
8. Motion to approve agenda was made by Luc Dorpmanns and seconded by Sanjay Patel.  
   No further discussion or objections were made.
9. Motion was carried unanimously with no objections or abstentions.
10. Discussion on status of the PAR, structured review of the standard and guide, collaboration with IEC
    1. It was reported that the PAR was approved on Sept 25, 2024 and will expire Dec 31, 2028.
    2. Collaboration with IEC  
       Kevin Juchem, the convener at IEC TC 14 MT "Phase-Shifting Transformers," presented the list of IEC experts nominated by the national committees. He also mentioned that this group will be involved in the development of 60076-57-135, the "Guide for the Application, Specification, and Testing of Phase-Shifting Transformers."
    3. Michael Thompson shared that the Power System Relaying and Control Committee (PSRC) will establish a Study group for C37.345 (IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers) in the next PSRC meeting in January.
    4. The discussions indicate that alignments with PCRS will bring benefit to the development of all three documents C57.135 (60076-57-135), 60076-57-1202 and C37.345.

Like duplications should be avoided and the best place where to move needs serious considerations.

* 1. Kevin Juchem presented a presentation created together with Luc Dorpmanns about ideas about “Content redistribution at IEEE/IEC 60076-57-135 and IEEE/IEC 60076-57-1202“
  2. Kevin Juchem presented the feedback received by the IEC Polish National Committee on Clause 13.7 in IEEE/IEC 60076-57-1202“. During the EN adaption the request was received to separate testing of short circuit impedance and losses oft he excitation unit (to add a clause at 13.7.2)

An extensive discussion about the request took place and the purpose of such a request was challenged. Since no one from the polish NC was present   
*--> Kevin Juchem will go back to the Polish NC and will request clarification and more information*

1. Planned next steps
   1. *Continue to review* (Standard posted – PTSC)  
      *Volunteers are requested to reach out to the ones who took over tasks and / or officers*
   2. Collection of feedback (via email)  
      Outcome of Rev 60076-1 if impact to PST – Paul Jarman
   3. In-person S25 Meeting in Denver, CO - Present the status and next steps  
      March 23-27, 2025
2. The meeting was adjourned at 14:30 PM (CDT)
3. Next meetings (planned):
   * Virtual meeting – might be scheduled before March 2025
   * In-person meeting S25 – March 23-27, 2025 in Denver, CO

Respectfully submitted,   
Ewald Schweiger - WG Chair

List of attendees for this meeting on the next page

List of attendees for this meeting:

|  |  |  |  |
| --- | --- | --- | --- |
| **Last Name** | **First name** | **Affiliation** | **Status** |
| Barker | Sean | Hitachi Energy | G |
| Beaudoin | Jason | Weidmann | G |
| Bhardwaj | Naveen | Trench Group | G |
| Biggie | Kevin | Weidmann | G |
| Brodeur | Samuel | Hitachi energy | G |
| Chan | Vivian | Hitachi Energy | G |
| Colopy | Craig | Retired from EATON | G |
| Czernorucki | Marcos | Hitachi Energy | G |
| Dorpmanns | Luc | Royal SMIT Transformers | M |
| Espitia | Egui | Reinhausen Mfg | G |
| Fu | Renjie | ERMCO | G |
| Hossain | Saif | Trench Group | G |
| Jarosz | Patrycja | IEEE SA | G |
| Juchem | Kevin | Hitachi Energy | M |
| Kaineder | Kurt | Trench | G |
| Katapalli | Thrinadha | Virginia Transformer Corp | G |
| Lee | Junho | HD Hyundai Electric | G |
| Lee | Jihun | HD Hyundai Electric | G |
| Lembacher | Stefan | Siemens Energy | G |
| Lugge | Andrew | Hitachi Energy | G |
| Martinez | Daniel | JFE Shoji Power Canada | G |
| McCullough | Douglas | Maxima - Hyundai | G |
| Murcia | Fredy | Siemens Energy | G |
| Musgrove | Ryan | Oklahoma Gas & Electric | M / Chair PTSC |
| Naderian | Ali | Consultant | G |
| Patel | Sanjay | SGB-Smit USA | M |
| Ploetner | Christoph | Siemens Energy | M |
| Rehkopf | Sebastian | Reinhausen Germany | M |
| Schrammel | Alfons | Siemens Energy | M |
| Schweiger | Ewald | Siemens Energy | M / Chair |
| Shannon | Mike | Rea Magnet Wire | G |
| Shertukde | Hemchandra | University of Hartford | G |
| Siebert | Stefan | Brockhaus Measurements | G |
| Simon | Preston | ETSI | G |
| Suman | Gerry | Electrical Technologies | G |
| Thompson | Michael | SEL Engineering Services | M / Chair PCRS |
| Van Dreel | Cole | American Transmission Co. | G |
| Velasquez | Juan | Magnetron sas | G |
| Viereck | Karsten | Reinhausen Germany | G |
| Watson | Joe | JD Watson and Associates | M |

**Attachment K.4.16**

WG Guide for Installation and Maintenance of Power Trf C57.93

Tuesday, October 29th, 2024

3:15 – 4:30 PM

Hyatt Regency, Grand Ballroom D

St. Louis, MO

Chairman: Scott Reed

Vice Chairman: Alwyn VanderWalt

Secretary: Kyle Stechschulte

The meeting was called to order at 3:15 pm by Chair Scott Reed. This is the first meeting for this Working Group. The current guide expires 12/31/2029. The PAR for this WG expires 12/31/2028.

Chairman posted the Patent Claim and Copyright slides. No notifications or comments were received.

Because this was the first Working Group meeting, there was no members or guests. 58 people were in attendance with 50 requesting membership to the WG with all requests granted.

The chair shared the title and scope as approved for the PAR. The chair suggested to form 7 study groups to target specific sections of the document as follows:

TF1 Shipping and Assembly–Ryan Musgrove

TF2 Vacuum Processing Methods—Kyle Stechschulte

TF3 Final Testing and Energization—Elizabeth Bray

TF4 Relocation and Field Repair—Alwyn VanderWalt

TF5 Maintenance—Weijun Li

TF6 Storage—Pat Rock

TF7 Editorial and Definitions—Jesse Duffy

Each TF leader presented a brief overview of their intensions and made a call for volunteers to be part of the task force groups. The Chair called on the task force leaders to report back progress for the spring meeting.

The chair called for new business: Wallace Binder asked about on incorporating C57.93a into the guide. The chair confirmed that after C57.93a is approved the WG will incorporate this amendment into our new guide. The WG will have the opportunity to review and approve/comment on what is incorporated into C57.93 after C57.93a is completed.

The meeting was adjourned at 4:30 p.m.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **First name** | **Last Name** | **Affiliation** | **Your Email** | **Member/Guest** |
| Elise | ArGuestld | SGB | Elise.arGuestld@sgb-smit.group | Member |
| Jason | Beaudoin | Weidmann | Jason.beaudoin@weidmann-group.com | Guest |
| Wallace | Binder | wbbinder consultant | wbbinder@ieee.org | Member |
| Sanket | Bolar | Oncor Electric Delivery | sanket.bolar@oncor.com | Member |
| Jeremiah | Bradshaw | Bureau of Reclamation | jeremiah.l.bradshaw@ieee.org | Member |
| Stuart | Chambers | EPRI International | schambers@epri.com | Member |
| sudip | chanda | Delta Star Inc | sudip.chanda2503@yahoo.com | Member |
| Eunyoung | Cho | HICO AMERICA | echo@hicoamerica.com | Member |
| Juan Carlos | Cruz Valdes | PROLEC GE | juancarlos.cruz@prolec.energy | Guest |
| Tim | Dappen | Cargill | Tim\_dappen@cargill.com | Member |
| Sami | Debass | EPRI | Sdebass@epri.com | Member |
| Gabriel | Delgado | Invenergy | gdelgado@invenergy.com | Member |
| Eric | Doak | D4EnergySolutions | Ericdoak@d4energysolutions.com | Member |
| Jesse | Duffy | Nashville Electric Service | jduffy@nespower.com | Member |
| Evgenii | Ermakov | Hitachi Energy | evgenii.ermakov@hitachienergy.com | Member |
| Lorne | Gara | Shermco | lgara@telus.net | Member |
| Brad | Grooms | NTS | B.grooms@atsllcwi.com | Member |
| Samuel | Gruskiewicz | Ge verGuestva | Samuel.gruskiewicz@ge.com | Guest |
| Ismail | Guner | Hydro-Quebec | ismailguner@ieee.org | Member |
| Roger | HaMember | GE VerGuestva | Roger.haMember1@ge.com | Member |
| William | Herron | Reinhausen | W.herron@us.reinhausen.com | Member |
| Ryan | Jonak | Portland General Electric | Ryan.Jonak@pgn.com | Guest |
| Thomas A. | Keels | kEElectric Engineering PLLC | thomasakeels@ieee.org | Member |
| Yeounsoo | Kim | MEPPI | Yeounsoo.kim@meppi.com | Member |
| Weijun | Li | Braintree Electric Light Department | wli@beld.com | Member |
| Mario | LocarGuest | Doble Engineering | mlocarGuest@doble.com | Member |
| Jose | Machain | Prolec Ge | joseluis.machain@prolec.energy | Member |
| Balakrishnan | Mani | Delta star field service | Balakrishnan\_mani@ieee.org | Member |
| Kumar | Mani | Duke Energy | kumar.mani@duke-energy.com | Member |
| Douglas | McCullough | Maxima Hyundai | Doug@maxima-sales.com | Guest |
| David | Murray | TVA | Dbmurray@tva.gov | Member |
| Ryan | Musgrove | Oklahoma Gas & Electric | Ryan.musgrove@ieee.org | Member |
| Anthony | Natale | HICO America | anatale@hicoamerica.com | Member |
| Mike | Guestlte | Kiewit | Guestlte@ieee.org | Member |
| Parminder | Panesar | Virginia Transformer Corp | parminder\_panesar@vatransformer.com | Member |
| Rakesh | Patel | Hitachi energy | rakesh.patel@hitachienergy.com | Member |
| Pedro | Pedro | Efacec Energia | pedropedro@efacec.com | Member |
| Homer | Portillo | Advanced Power TechGuestlogies | hportillo@advpowertech.com | Member |
| Scott | Reed | Mva | sreed@mvadiagGueststics.com | Member |
| Perry | Reeder | PA Transformer | Perry.reeder@patransformer.com | Member |
| Diego | RobaliGuest | Megger | [Diego\_robaliGuest@ieee.org](mailto:Diego_robalino@ieee.org) | Member |
| Patrick | Rock | American Transmission Company | patrock@ieee.org | Member |
| Alaor | Scardazzi | Siemens Energy | alaor.scardazzi@siemens-energy.com | Member |
| Stefan | Schindler | Maschinenfabrik Reinhausen GmbH | s.schindler@reinhausen.com | Guest |
| Ewald | Schweiger | Siemens Energy | ewald.schweiger@ieee.org | Member |
| Thomas | Spitzer | City Transformer Service Co | t.spitzer@sbcglobal.net | Member |
| Kyle | Stechschulte | AEP | Kdstechschulte@aep.com | Member |
| H. Allen | Steele | TVA | hasteele@tva.gov | Member |
| David | Stockton | SBC | david@stockton-consulting.com | Member |
| Jonathan | Tan | Guestrthern Transformer | jtan@Guestrtherntransformer.com | Member |
| Troy | Tanaka | Burns & McDonnell | ttanaka@burnsmcd.com | Member |
| Jim | Thompson | T & R Service Company | jim@svtv.com | Member |
| Eduardo | Tolcachir | TTE Transformers | etolcachir@tte.com.ar | Member |
| Alwyn | Vanderwalt | ECI | A.vanderWalt.us@eciusa.com | Member |
| Alan | Washburn | Burns and McDonnell | awashburn@burnsmcd.com | Member |
| Matthew | Webb | GE VerGuestva | Matthew.webb@ge.com | Guest |
| Elliot | White | SD Myers | Elliot.white@sdmyers.com | Guest |
| Kris | Zibert | Allgeier, Martin & Associates | Kris.zibert@amce.com | Member |

**Attachment K.4.18**

Unapproved Meeting Minutes

PC57.153 WG Guide for Paralleling Regulating Transformers

Minutes from October 29, 2024 – St. Louis Meeting

Officers

Chair – Mark Tostrud

Vice Chair – Cihangir Sen

Secretary – Zan Kiparizoski

1. Call to Order

The meeting was called to order at 4:45 PM on October 29, 2024

2. Chairs Remarks

After the officer’s introduction, several changes to the previously sent agenda were noted. These changes include the addition of a draft for Annex C of the document, detailing aspects related to circulating current, and a new topic addressing issues with inclusive language, particularly terminology such as “master/follower.

**2.1 Essential Patent Claims**

IEEE SA slides related to the Essential Patent Claims were reviewed. The Chair provided an opportunity to identify any patent related claim. No claims were made.

**2.2 Copyright Policy**

IEEE slides related to Copyright Policy were reviewed. No copyright issues were raised.

**2.3 Participant Behavior**

IEEE slides related to participant behavior in the individual working group/task force process were reviewed. There were no comments.

3. Attendance

* There were 43 attendees in the meeting
  + 17 members were present
  + 7 guests requested membership
* Quorum check
* Quorum was achieved, 17 of 20 members were present

4. Approval of the agenda and minutes from the last task force meeting

**Meeting Agenda**

As noted in the chair’s remarks, modifications to the emailed agenda were made.

* Welcome and call to order
* QR Code Attendance Registration and Distribution of attendance rosters
* Call for Essential Patents
* Review of IEEE-SA Copyright policy
* Review of Code of Conduct Policy
* Introductions
* Quorum Check
* Review and approval of the meeting agenda
* Review and approval of the minutes from the Spring 2024 meeting
* Review and discussion of reverse power flow definition
  + Request for volunteers to draft a section on “Recommended actions during reverse power flow”
* Review draft of Annex C – Concept of Apparent Circulating Current - Dr Karsten Viereck
* Old Business –
  + Resolution of Bibliography Reference B.1 - CEMA Std L10-1 CEMA Standard for Load Tap Changing Paralleling Schemes
* Use of Inclusive Language in Technical Terminology and Communications (IEEE P3400)
  + - Standard is still in draft but will likely be approved before we go to ballot
    - Concerns were raised over the terminology for the “Master/Follower” parallel method
* Next Meeting(s)
  + Virtual - TBD
  + In Person – March 25, 2025 – Denver, CO
* Adjourn

Motion to approve the agenda

* Motion by Dan Sauer
* Seconded by Dharam Vir
* Unanimous approval

**4.2 Approval of the minutes from the last working group meeting in spring , 2024**

No objection to unanimous approval of the meeting minutes from spring 2024 working group meeting.

5. Review and discussion of reverse power flow definition and document section

Discussion began with a review of the reverse power flow definition agreed upon in the last meeting. It was brought to attention that WG for C57.133 is forming a task force for further review of the reverse power flow definition. It was proposed to retain the current definition in our document unless there are objections.

A question was raised about whether C57.133 had already defined reverse power flow. It was clarified that the group would create its own definition instead.

A suggestion to reference C57.133 in the documentation was discussed, but concerns were raised about the number of external references already included.

Ultimately, it was decided to table the definition final text decision for future discussion.

Volunteers were asked to write the section related to the reverse power flow of the transformers.

* Francis Mill and
* Mark Tostrud

Volunteered to work on this section

6. Old Business

* 1. **Resolution of Bibliography Reference B.1 - CEMA Std L10-1 CEMA Standard for Load Tap Changing Paralleling Schemes**

A review of the references in the old document revealed that a CEMA L10-1 standard, , was used . However, further investigation confirmed that the CEMA organization no longer exists, and this standard is now unavailable. Given the lack of access to this document, the working group discussed whether to retain any excerpts or images from it. Due to availability and copyright concerns, it was agreed that the reference to the CEMA Standard should be removed from the updated draft.

A motion to eliminate the B.1 reference from the document was made:

* Motion by Dharam Vir
* Seconded by Francis Mills
* Unanimous approval

**6.2 Review of the draft for the Annex C , Concept of the apparent circulating currents**

Presentation detailing the concept of the apparent circulating currents was presented by Dr. Karsten Viereck. Presentation will be distributed among the WG members.

**6.3 Use of Inclusive Language in Technical Terminology and Communications (IEEE P3400)**

During the approval PAR process, concerns were raised regarding terminology in the guide, specifically with terms like "master/follower related to the specific control scheme. This terminology was questioned for potentially non-inclusive language. IEEE attempted to address this by suggesting guidelines for more neutral terminology. Initially, the terms were removed temporarily from the guide’s purpose to facilitate PAR approval, deferring the issue for later resolution.

The proposed change is to replace "master/follower" with terms like "primary/secondary" or "leader/follower." This change would standardize terminology within the guide, although it would not address terminology inconsistencies in field use.

During the discussion it was noted that manufacturers commonly use "master/follower," and it was suggested including an informative note acknowledging that alternate terminology exists in the industry. This would help readers understand the broader industry context.

It was also discussed that the IEEE P3400 document, which might provide additional guidance, has not yet been approved.

At the end of discussion, a motion was made to: suspend further discussion related to the "master/follower" terminology until formal guidance is received from IEEE.

* Motion by Weijun Li
* Seconded by Ryan Musgrove
* Unanimous approval

7. New Business

No new business was identified.

8.Next Meeting

The next scheduled meeting will be at the spring meeting, 2025.

9.The meeting adjourned at 5:45 PM

10.Minutes

The minutes were recorded by Zan Kiparizoski – secretary and reviewed by Mark Tostrud – Chair and John Sen vice-chair

|  |  |  |  |
| --- | --- | --- | --- |
| **C57.153 – Guide for Paralleling Regulating Transformers** | | | |
| **Last Name** | **First Name** | **Affiliation** | **Role** |
| Avelino | Paulo |  | Guest |
| Bargone | Gilles | FISO | Member |
| Berancourt | Edwing | Siemens Energy | Guest |
| Blaydon | Daniel | Baltimor Electric | Member |
| Crockett | Janet | Fayetteville PWC | Guest |
| Elson | Eric | San Diego G&E | Guest |
| Eopitla | Equi | MR | Guest |
| Fong | Satford | Georgia Power | Guest |
| Gambco | Jose | H-J fammily of Companies | Guest |
| Garnder | James | Prolec GE | Guest |
| Heiden | Kyle | [Eaton](mailto:Kyle.heiden@eaton.com) | Member |
| Hoffman | Saramma | PPL | Member |
| Hollrah | Derek | Burnes&McDonnell | Guest |
| Joshi | Akash | Kimley-Hash/Kleev USA | Guest |
| Jung | Francisco | MR | Guest |
| Katapalli | Thrinadhia | Virginia Transformers | Guest |
| Kiparizoski | Zan | Howard Industries | Secretary |
| Knapp | Evan | Eaton | Member |
| Li | Weijun | Braintree Electric Light Dept. | Member |
| Marulanda | Katherine | Magnetron | Guest |
| Mendez | Omar | Prolec GE | Guest |
| Mills | Francis | Power Engineers | Member |
| Murcia | Fredy | Siemens Energy | Guest |
| Musgrove | Ryan | Oklahoma Gas&Electric | Member |
| Obcegan | Daniel | TTE Transformers | Guest |
| Park | Den | Hico | Guest |
| Radu | Ion | Hitachi Energy | Member |
| Rock | Pat | American Transmission | Guest |
| Rossini | Yuri | Siemens Energy | Guest |
| Sauer | Dan | Eaton | Member |
| Schindler | Stefan | MR | Guest |
| Schleismann | Eric | Southern Company | Member |
| Sen | Cihangir | Duke Energy | Vice-chair |
| Shalbi | Jaber | Vantran Transfomrers | Guest |
| Sherturde | Heinchora | Uhart/Ddi | Guest |
| Thompson | Michael | SEL Engineering Services | Guest |
| Tostrud | Mark | Dynamic Ratings | Chair |
| Vaagensmith | Bjorn | Idaho National Lab | Guest |
|  |  |  |  |
| **Last Name** | **First Name** | **Affiliation** | **Role** |
| Viereck | Karsten | Reinhausen | Member |
| Vir | Dharam | Prolec GE | Member |
| Young | Tim | Hitachi Energy | Guest |
| Zaman | Malia | IEEE SA | Guest |
| Zhang | Shibao | Pcore Electric | Member |
|  |  |  |  |