Annex K Power Transformers Subcommittee

October 25, 2023
Kansas City, Missouri, USA
Meeting Time: 1:30-2:45 p.m.

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

K.1 Meeting Attendance

The Power Transformers Subcommittee (PTSC) met on Wednesday, October 25 at 1:30 p.m. The attendance record indicates that 89 out of 107 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 243 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.

Seven individuals requested membership by speaking with or emailing PTSC officers after the meeting. Five attended at least 3 out of the last 5 meetings and therefore qualified for "Member" status. Two have not been recorded in attendance in 3 out of the last 5 meetings, and therefore not yet qualified for membership.

Twenty-three individuals updated their contact information. Seven individuals have been moved from "Member" to "Guest" for not having recorded attendance at the last 3 out of 5 meetings. These members have been contacted by the Chair and notified of this status change.

With the membership changes stated above, PTSC has a total of 105 members after the Fall 2023 meeting.

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

K.2 Approval of Agenda and Meeting Minutes

The Chair asked the membership for a motion to approve the agenda as modified and the Spring 2023 meeting minutes as circulated. Dan Sauer (Eaton Corporation) made a motion to approve the agenda and meeting minutes, which was seconded by Stephen Shull (BBC Electric Services, Inc.). The agenda and Spring 2023 meeting minutes were approved without objection. The approved agenda can be found in Attachment K.2.

K.3 Chair's Remarks

The Chair provided an update on the PTSC roster. Three members have 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. The Chair also announced that guests who wish to become a member of the Power Transformers Subcommittee should see subcommittee officers after the meeting. 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 announced that there was no update on the new system tracking attendance. Paper roster will continue to be used until the new system is ready and data migration is complete.

The Chair also announced that the working group leadership training through IEEE has been changed to optional, but it is highly recommended that all active members of the standards organization take advantage of this training. The Chair pointed out that Understanding IEEE SA's Antitrust, Competition, and Commercial Terms Policies training is mandatory for standards committee/working group officers.

Note that the training can be found at the following link:
https://iln.ieee.org/public/contentdetails.aspx?id=760D82C64E9948D7B726FB10303A3025

The Chair reminded all attendees that Patrycja Jarosz, the new IEEE staff contact for PTSC, is available for assistance. Malia Zaman will continue to be available as well.

The Chair introduced 3 new members that were added to the PTSC membership list since the Spring 2023 meeting. The new members are Hemchandra Shertukde (University of Hartford), Richard vonGemmingen (Dominion Energy), and Joshua Yun (Virgina Transformer Corp.).

The Chair provided the requirements for establishing & maintaining membership and urged members to participate in all email ballot requests.

K.4 Working Group and Task Force Reports

K.4.1 Revision of C57.131, Standard Requirements for Tap Changers – Craig Colopy

This working group met on Monday and achieved a quorum. The initial ballot of Draft 1.2 closed on May 11, 2023 with an approval rate of 94% (a total of 95 ballots). WG Chair Craig Colopy (Retired) reviewed the Disapprove comments with the working group while providing disposition status and detail. Agreement from the working group on disposition of all comments was obtained. A recirculation ballot for Draft 1.3 is planned before the end of 2023. Future revision will consider working with IEC on a dual logo standard using 60214-1 and C57.131 documents.

The complete meeting minutes can be found in Attachment K.4.1. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.2 WG C57.156, Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors – Peter Zhao

This working group met on Monday. This was the 1st official meeting for revision of the document and the focus of the meeting was strategic planning. WG Chair Peter Zhao (Hydro One) reviewed the scope of the work with the group. A standard template was created for proper documentation of comments and proposals. It is requested that comments/changes/proposals be recorded in the template. Two years or 4 meetings are planned for collection of changes and proposals, and one year or two meetings for completion of a draft document. The WG will be searching for a volunteer to fill the open position of secretary.

The complete meeting minutes can be found in Attachment K.4.2. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.3 Revision of C57.116, Guide for Transformers Directly Connected to Generators – Weijun Li

This working group has completed its work; therefore, they won't meet again until the next revision cycle, probably in 3-4 years.

K.4.4 PAR Study Group for IEEE 638, Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations – Craig Swinderman

This PAR study group met on Monday with 3 members and 23 guests present. 8 guests requested membership. TF Chair Craig Swinderman (Mitsubishi Electric Power Products) said that a PAR request was submitted on October 11, 2023 to revise IEEE 638. The PAR is on the December 5-6, 2023 NesCom agenda for review and approval by IEEE SA Standards Board.

It was highlighted to the group that IEEE 638 Standard is closely related to the other standards IEEE/IEC 60780-323 (2016) and IEEE/IEC 60980-344 (2020). Both standards have been revised since the latest version of IEEE 638 was published. Once the PAR is approved in December 2023, a team of volunteers will review the changes made to these two existing standards to determine what changes will need to be added in the next revision of IEEE 638.

A virtual working group meeting will be scheduled in the January 2024 timeframe to discuss the proposed changes.

The complete meeting minutes can be found in Attachment K.4.4. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.5 Revision of C57.135, Guide for the Application, Specification, and Testing of Phase-Shifting Transformers – Ewald Schweiger

This working group met on Monday and achieved a quorum. WG Chair Ewald Schweiger (Siemens Energy) provided an update on the status of IEEE/IEC collaboration. The IEEE PAR will need to be updated to match the IEC title of "Technical Guideline for the Application, Specification, and Testing of Phase-Shifting Transformers". Michael Thompson (SEL Engineering Services, Inc.) is the liaison to C37.245 Guide for the Application of Protective Relaying for Phase Shifting Transformers. Note that PE/PSRCC – Power System Relaying and Control Committee is the sponsor committee for C37.245.

The group continued to discuss the existing document. Presentations were given on the review of Clauses 4, 5, 9, 10 and 11. This working group is looking for volunteers/specialists in protection & control to review the existing document for improvements.

The complete meeting minutes can be found in Attachment K.4.5. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.6 Revision of C57.143, Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Equipment – Mike Spurlock

This working group met on Monday. A quorum was not achieved. WG Chair Mike Spurlock (Spurlock Engineering Services, LLC) reported that the ballot of Draft 1.4 was completed on June

11, 2023 with a response rate of 86% and an approval rate of 93%. There were 676 ballot comments. Four comment resolution groups are working on the comments. 84% have been accepted or revised, 8.5% rejected, and 7.5% remained to be processed.

A 2-year PAR extension was granted on September 21, 2023. The updated PAR expires December 31, 2025. The group plans to recirculate the draft for ballot by January 31, 2024.

The complete meeting minutes can be found in Attachment K.4.6. This meeting should be the final meeting for this WG. No in-person meeting is planned for Spring 2024.

K.4.7 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 expected date of submission of draft to the IEEE SA for initial ballot is May 2024 and the projected completion date for submittal to RevCom is December 2024.

The proposed revisions to Section 4.2 "Investigation Flow Chart", Table 2, and Table 8 (under "Internal Inspection, Main Tank" were voted on and approved. Proposed changes to the introduction section will be presented at the next WG meeting. A total of 7 new items under "Definitions" were discussed. 5 were approved; 2 will be re-worked and emailed to the WG members for a vote before the next meeting.

The complete meeting minutes can be found in Attachment K.4.7. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.8 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) provided an update on the project timeline. He reported that Draft 0 is in circulation for straw ballot within the working group. A total of 24 comments, mostly editorial and some technical, were received before the Kansas City meeting. The deadline for receiving straw ballot comments has been extended to November 30, 2023. Sixteen members volunteered to join the comment resolution group, resolve comments, and report back to the working group. The plan is to vote on Draft 1 for SA ballot during the Spring 2024 meeting.

The complete meeting minutes can be found in Attachment K.4.8. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.9 WG C57.157, Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid-Immersed Transformers – Adam Sewell

This group met on Tuesday. This was the first meeting as a working group. Out of the 27 active participants, 15 requested membership and have become members. The PAR was approved June 2023 and expires December 2027. Three individuals volunteered to review the current document and propose changes at the next WG meeting. Discussion was brought up about looking at synthetic esters as the current document does not have information about this type of ester. WG Chair Adam Sewell (Quality Switch, Inc.) will either get a presentation or a presenter for the next meeting on the topic of synthetic esters.

The complete meeting minutes can be found in Attachment K.4.9. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.10 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 Kansas City. WG Chair Greg Anderson (GW Anderson & Associates, Inc.) reported that the initial SA ballot closed with 120 comments. A 10-member comment resolution group met 4 times, completed one re-circulation, and resolved all comments. The final draft was approved as a revised standard by IEEE SA on September 21, 2023.

K.4.11 WG PC57.17, Standard Requirements for Arc Furnace Transformers – Dom Corsi

This group met on Tuesday. This was the first meeting as a working group. Out of the 34 active participants, 20 requested membership and have become members. The group reviewed the Definitions subclause and the New High Temperature Insulation Application subclause and confirmed study group volunteers for each subclause. WG Chair Dom Corsi (Doble Engineering Company) has an action item to get previous publication in the latest word template and post on the IEEE PES Transformers Committee website for the WG and study groups. Each study group will provide recommendations for edits for their subclause at the next WG meeting.

The complete meeting minutes can be found in Attachment K.4.11. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.12 WG C57.107, Recommended Practice for Developing Short-Term Overexcitation V/Hz Curves for Transformers Directly Connected to Generators – Joe Watson

This working group met on Tuesday and achieved a quorum. WG Chair Joe Watson (JD Watson and Associates Inc.) reported that Draft 3 was balloted in August 2023 and received 90% approval with 63 comments and a few more comments after the balloting closed. The comment resolution group led by Ryan Hogg (Bureau of Reclamation) met twice, resolved all comments, and notified all commenters of the resolutions. A summary of the comments was presented at the meeting. The WG approved a motion to designate resolution authority to the comment resolution group. Draft 4 will be issued for re-circulation within a couple of weeks after the Kansas City meeting.

The complete meeting minutes can be found in Attachment K.4.12. This meeting should be the final meeting for this WG. No in-person meeting is planned for Spring 2024.

K.4.13 TF C57.93, IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – Scott Reed

This task force met on Tuesday and achieved a quorum. TF Chair Scott Reed (MVA) shared the existing title and scope with the task force. The Chair also reviewed the transformer and LTC maintenance presentations from the past two meetings, discussed the scopes of C57.140, C57.152 and C57.170, and presented previous feedback regarding requested changes to the document. The members and guests discussed 3 options regarding maintenance: remove maintenance from the guide, update the guide to include a major maintenance section, or do an update and expand the light maintenance in the guide.

The next step is to issue a straw ballot to get input from the group to review the maintenance section of the guide and determine how to proceed.

The complete meeting minutes can be found in Attachment K.4.13. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.14 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 task force studying cold start up for natural esters performed testing at -15°C, -25°C, and -35°C, and monitored the winding and fluid temperatures as the load increased. For transformers at -15°C, the transformer should be energized with no load for 2 hours. For every 10°C decrease in temperature, an additional hour of no-load time should be added. The loading period shouldn't be less than 2 hours and gradually increased.

There were no meeting minutes for this liaison activity.

K.4.15 TF C57.153, Guide for Paralleling Regulating Transformers – Mark Tostrud

This task force met on Tuesday and achieved a quorum. The group discussed NesCom's comments on the scope in the PAR. TF Chair Mark Tostrud (Dynamic Ratings, Inc.) will submit an updated PAR based on the discussion from this meeting. The Chair also requested volunteers to address the comments received from the straw ballot performed in Spring 2023 and draft a new section on the effect of reverse power flow on paralleling.

The complete meeting minutes can be found in Attachment K.4.15. The next in-person meeting is planned for Spring 2024 in Vancouver, BC, Canada.

K.4.16 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

PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) provided an update on behalf of Brian Sparling (Kinectrics), the liaison to this entity PAR, who was not in attendance. The PAR has been approved and a document number has been assigned. The liaison will have more updates to provide at the next meeting.

K.5 Old Business

Transformer Seismic Concerns – IEEE 693 "Amendment"

PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) provided an update on recent discussions with Transformers Committee leadership, IEEE PES Substations Committee, and Bushings Subcommittee Chair Eric Weatherbee (PCORE Electric). The general observation from the Spring 2023 PTSC meeting and follow-up discussions was that the Transformers Committee should voice concerns about the proposed major changes as they would affect power transformer designs.

Enrique Betancourt (Prolec GE) said that IEEE Draft Recommended Practice for Seismic Design of Substations Amendment (693 Amendment) is currently in balloting process, and he is a member of the Comment Resolution Group (CRG). He also mentioned that there was discussion within the CRG about the current method to qualify seismic ability of bushings and that those concerns had been explained to PTSC during a technical tutorial in 2021. Mr. Betancourt recalled that the current bushing qualification practice was demonstrated to be insufficient for many transformers while using an amplification factor of 2, which is typically applied for high seismic areas. He said

that the 693 Amendment Group tried to address the subject by specifying a modeling method which included dynamic elements from the transformer and the bushings, but that process was not clearly described in the tutorial session. He said that the 693 Amendment Group felt that there was no response from the Transformers Committee (example: forming a study group to address the question: relevance, feasibility to solve, etc.); therefore, the topic of bushing qualification practice remains somewhat as an "open question".

Eric Weatherbee (PCORE Electric) said that he was not aware of any open question left unanswered from the 2021 technical tutorial. Ryan Musgrove (Oklahoma Gas & Electric) also mentioned that he was unaware of any questions or open requests from the Substations Committee regarding this topic.

Joe Watson (JD Watson and Associates Inc.) said that the 693 Amendment process seems like they redlined the whole document and called it an amendment. He also pointed out that an amendment doesn't change the expiration date of the document, which means it still expires December 2028. After much discussion, it was clear that the Transformers Committee should continue to voice concerns about the proposed major changes as they would affect power transformer designs. PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) said that Transformers Committee Chair Ed teNyenhuis (Hitachi Energy) will file an official complaint with the IEEE PES Technical Council. The PTSC Chair also encouraged members, especially members of the Power Transformers and Bushings subcommittees, to actively participate in the review and ballot of IEEE 693 in the future.

Entity PAR Request "Guide for Power Transformers for Low-frequency (10-30Hz) Power Transmission"

The Chair displayed a slide with the project title, scope, and purpose of the Entity PAR Request "Guide for Power Transformers for Low-frequency (10-30Hz) Power Transmission" that was submitted by an entity group based in China. Dan Sauer (Eaton Corporation) suggested changing "Requirements" to "Recommendations" in the scope and purpose of the PAR. Detlev Gross (Power Diagnostix Consult GmbH) and Kumar Mani (Duke Energy) both voiced concerns about the wording of "Design" and "Applications" in the purpose of the PAR. Standards Coordinator Stephen Shull (BBC Electrical Services, Inc.) pointed out that a purpose is not required for a PAR so completely removing it could be an option. Joe Watson (JD Watson and Associates Inc.) suggested keeping the purpose for clarity of the PAR. The general understanding was that modifications to the Scope and the Purpose were necessary to have a PAR that would be deemed appropriate for an IEEE guide. Poovi Patel of EPRI commented that despite language barriers the individuals in the entity PAR group usually listen and are willing to make adjustments.

Upon further discussion, the PAR was modified to read the following:

<u>Project Title:</u>
Guide for Power Transformers for Low-frequency (10-30Hz) Power Transmission

<u>Scope:</u>
This guide provides technical guidance for the design and application of power transformers for low-frequency (10-30Hz) power transmission. It includes general recommendations, design concepts, electrical, physical and mechanical characteristics, as well as test items and methods of low-frequency power transformers.

<u>Purpose:</u>

The purpose of this guide is to suggest the technical recommendations and the test code of power transformers for low-frequency (10-30Hz) power transmission.

Dan Sauer (Eaton Corporation) made a motion to accept the PAR as modified. Mickel Saad (Hitachi Energy) seconded the motion. The motion passed with unanimous approval. Sheldon Kennedy (Sheldon P. Kennedy Engineering, PLLC) volunteered as the liaison to this entity PAR. PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) will communicate the modified PAR and new liaison to the entity PAR group via email.

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

This business item was tabled at the end of the Spring 2023 meeting. Hemchandra Shertukde (Harfort University) said the idea originated from a student of his. The goal is to create a document for the use of IoT for fault monitoring of power transformers. It's recognized that there are various products on the market for monitoring and protecting transformers. Alan Sbravati (Hitachi Energy) said Brian Sparling's group already has a significant amount of information on this topic (reference: K.4.16). Both Tim Raymond (EPRI) and Trenton Williams (Advanced Power Technologies) expressed concerns about the purpose of a new document and any guidance on how to collect, aggregate, and interpret data. Ryan Musgrove (Oklahoma Gas & Electric) also mentioned that there is already a good amount of information, especially communications, in IEEE C57.143 Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Equipment. Joe Watson (JD Watson and Associates Inc.) suggested that PTSC set up a task force to investigate this subject.

PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) appointed Hemchandra Shertukde to chair a study group to further discuss and report back at the next meeting.

K.6 New Business

C57.12.10, Standard Requirements for Liquid-Immersed Power Transformers – Revision due 2027

The revision of this document is due in 2027. The Chair will appoint a volunteer to lead a study group to review the document and suggest next steps. Anyone who is interested in being the study group leader is encouraged to contact the PTSC Chair at ryan.musgrove@ieee.org.

C57.12.140 Guide for Evaluation and Reconditioning of Liquid Immersed Power Transformers – Revision due 2027

The revision of this document is due in 2027. The Chair will appoint a volunteer to lead a study group to review the document and suggest next steps. Anyone who is interested in being the study group leader is encouraged to contact the PTSC Chair at ryan.musgrove@ieee.org.

60076-57-1202 – Liquid Immersed Phase-Shifting Transformers – Revision due 2026

The revision of this document is due in 2026. The Chair will appoint a volunteer to lead a study group to review the document and suggest next steps. Anyone who is interested in being the study group leader is encouraged to contact the PTSC Chair at ryan.musgrove@ieee.org.

Following the meeting and communication with volunteers and past WG leaders, the following chairs were selected to head the task forces discussed as new business in the meeting:

C57.12.10 task force chair: Scott Digby (Duke Energy)
C57.12.140 task force chair: Sanjib Som (Pennsylvania Transformer)
60067-57-1202 task force chair: Ewald Schweiger (Siemens Energy)

K.7 Adjournment

The meeting adjourned at 2:45 p.m.

K.8 Attachments

Attachment K.1 – Attendance
Attachment K.2 – F23 PTSC Agenda
Attachment K 4.1 – C57.131 Minutes
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 Minutes
Attachment K 4.7 – C57.125 Minutes
Attachment K 4.8 – C57.170 Minutes
Attachment K 4.9 – C57.157 Minutes
Attachment K 4.10 – C57.150 Minutes (No Meeting)
Attachment K 4.11 – C57.17 Minutes
Attachment K 4.12 – C57.107 Minutes
Attachment K 4.13 – C57.93 Minutes
Attachment K 4.14 – Liaison to PC57.93a (No Meeting Minutes)
Attachment K 4.15 – C57.153 Minutes
Attachment K 4.16 – Liaison to Entity PAR for C57.145 (No Meeting Minutes)

Role	First Name	Last Name	Company
Guest	Isaac	Abdalla	HICO America
Member	Kayland	Adams	Prolec GE Waukesha
Guest	Thomas	Aikens	Virginia Transformer
Guest	Alex	Alahmed	Evergy Wolf Creek
Guest	Jennie	Aldenlid	Hitachi Energy
Guest	Robert	Allison	Dominion Energy
Member	Gregory	Anderson	GW Anderson & Associates, Inc.
Member	Tauhid Haque	Ansari	Hitachi Energy
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Elise	Arnold	SGB
Guest	Kush	Arora	Reinhausen
Member	Javier	Arteaga	Hitachi Energy
Member	Onome	Avanoma	MJ Consulting
Guest	Edmon	Aveolo	BPA
Member	Donald	Ayers	Ayers Transformer Consulting
Member	Gilles	Bargone	FISO Technologies Inc.
Guest	Sean	Barker	Hitachi Energy
Member	Christopher	Baumgartner	We Energies
Guest	Jason	Beaudoin	Weidmann Electrical Technology
Member	Enrique	Betancourt	Prolec GE
Guest	Edwin	Betancourt	Siemens Energy
Guest	Rahul	Bhardwaj	Burns & McDonnell
Guest	Vivek	Bhatt	Prolec GE
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
Guest	Michael	Botti	Hyosung HICO
Guest	Jeffrey	Britton	Doble Engineering Co.
Guest	Samuel	Brodeur	Hitachi ABB Power Grids
Member	David	Calitz	Siemens Energy
Guest	Juan Alfredo	Carrizales	Prolec GE
Member	Juan	Castellanos	Prolec GE
Guest	Marcelo	Catugas	Neil Services, Inc.
Member	Stuart	Chambers	SD Chambers Consulting
Guest	Vivian	Chan	Hitachi Energy

Guest	Jonathan	Cheatham	General Electric
Guest	Eun	Cho	HICO America
Member	Craig	Colopy	Retired - General Interest
Guest	Daniel	Crockett	Ameren
Guest	Janet	Crockett	Fayetteville PWC
Member	Juan Carlos	Cruz Valdes	Prolec GE
Guest	Roberto	Da Silva	Cargill, Inc.
Guest	Thomas	Dauzat	AEP-SWEPCO
Member	Eric	Davis	Consultant
Guest	Pouneh	Davoudi	Delta Star Inc.
Guest	Everton	De Oliveira	Siemens Energy
Guest	Gabriel	Delgado	Invenergy
Member	Scott	Digby	Duke Energy
Guest	Nikolaus	Dillon	Dominion Energy
Guest	Larry	Dix	Quality Switch, Inc.
Guest	Jeffrey	Door	H-J Family of Companies
Guest	Luc	Dorpmanns	Royal SMIT Transformer
Guest	Zachary	Draper	Delta-X Research Inc.
Member	Hakim	Dulac	Advanced Power Technologies
Guest	James	Dunn	Unifin International
Member	Samragni	Dutta Roy	Siemens Energy
Guest	William	Elliott	AEP-SWEPCO
Member	Evgenii	Ermakov	Hitachi Energy
Guest	Marco	Espindola	Hitachi Energy
Guest	Florin	Faur	SPX Transformer Solutions, Inc.
Member	Reto	Fausch	RF Solutions
Member	Marcos	Ferreira	Quanta Technology
Member	Hugo	Flores	Hitachi Energy
Member	Bruce	Forsyth	Cargill, Inc.
Guest	Raymond	Frazier	Ameren
Guest	Jose	Gamboa	H-J Family of Companies
Guest	Lorne	Gara	Shermco
Member	Eduardo	Garcia Wild	Siemens Energy
Guest	James	Gardner	Prolec GE Waukesha
Guest	Rob	Ghosh	General Electric
Member	Ramsis	Girgis	Hitachi Energy
Guest	Luis	Gonzalez	Conduct Industries
Guest	Jose Antonio	Gonzalez Ceballos	Georgia Transformer
Guest	Alireza	Gorzin	Black & Veatch
Guest	Shawn	Gossett	Ameren
Guest	Detlev	Gross	Power Diagnostix Consult GmbH

Member	Ismail	Guner	Hydro-Quebec
Member	Niklas	Gustavsson	Hitachi Energy
Member	Attila	Gyore	M&I Materials Ltd
Guest	Corey	Hanson	Flex-Core
Member	Roger	Hayes	General Electric
Guest	Peter	Heinzig	Weidmann Electrical Technology
Guest	Ronald	Hernandez	Doble Engineering Co.
Guest	Carlos	Hernandez	Delta Star Inc.
Member	Gary	Hoffman	Advanced Power Technologies
Member	Saramma	Hoffman	PPL Electric Utilities
Member	Ryan	Hogg	Bureau of Reclamation
Guest	Thomas	Holifield	Howard Industries
Guest	Derek	Hollrah	Burns & McDonnell
Member	Philip	Hopkinson	HVOLT Inc.
Guest	Patrycia	Jarosz	IEEE SA
Member	John	John	Virginia Transformer Corp.
Member	Kurt	Kaineder	Trench Austria
Guest	Thrinadha	Katapalli	Virginia Transformer
Guest	Nathan	Katz	PacifiCorp
Guest	Jerzy	Kazmierczak	Hitachi Energy
Member	Sheldon	Kennedy	Sheldon P. Kennedy Engineering, PLLC
Guest	Gael	Kennedy	GR Kennedy & Associates LLC
Guest	Stacey	Kessler	Ulteig
Guest	Qasim	Khan	Neetrac Georgia Tech
Member	Zan	Kiparizoski	Howard Industries
Member	Egon	Kirchenmayer	Siemens Energy
Guest	Klaus	Koeck	Trench Austria
Guest	Anton	Koshel	Delta Star Inc.
Guest	Alexander	Kraetge	OMICRON electronics Deutschland GmbH
Guest	Andrew	Lawless	Covested International
Guest	Fernando	Leal	Prolec GE
Guest	Junho	Lee	Hyundai Electric
Secretary	Weijun	Li	Braintree Electric Light Dept.
Guest	Luc	Loiselle	Tetra Tech
Guest	Xose	Lopez-Fernandez	Universidade de Vigo
Guest	Mark	Lowther	Kruger Products, Inc.
Guest	Jose	Machain	Prolec GE
Guest	Jinesh	Malde	M&I Materials Inc.
Guest	Darrell	Mangubat	Siemens Energy LLC
Member	Kumar	Mani	Duke Energy
Guest	Moses	Manzano	Hyosung HICO

Guest	Swapnil	Marathe	Megger
Guest	Daniel	Martinez	Lamination Specialties Inc.
Guest	Brian	McBride	Cargill, Inc.
Guest	Brian	McCarrick	Virginia Transformer
Member	Thomas	Melle	HIGHVOLT
Guest	Toni	Mellin	Vaisala
Guest	Michael	Mille	Siemens Energy
Guest	Francis	Mills	Power Engineers, Inc.
Guest	Juliano	Montanha	Siemens Energy
Member	Emilio	Morales-Cruz	Qualitrol Company LLC
Guest	Marta	Munoz	Hitachi Energy
Guest	Hugo	Murillo	H-J Family of Companies
Member	David	Murray	Tennessee Valley Authority
Chair	Ryan	Musgrove	Oklahoma Gas & Electric
Guest	Shankar	Nambi	Bechtel
Guest	Anthony	Natale	HICO America
Member	Kristopher	Neild	Megger
Guest	Mark	Newbill	Hitachi Energy
Guest	Rudolf	Ogajanov	Hitachi Energy
Member	Anastasia	O'Malley	Consolidated Edison Co. of NY
Guest	Tyler	Parenti	Cargill, Inc.
Guest	Hoony	Park	ILJIN Electric
Guest	Dwight	Parkinson	EATON Corporation
Member	Poorvi	Patel	Electric Power Research Institute (EPRI)
Guest	Sylvain	Plante	Hydro Quebec
Guest	Miguel	Plascencia	PG&E
Guest	Christoph	Ploetner	t.b.a.
Guest	Homero	Portillo	Advanced Power Technologies
Guest	Daniel	Posadas	Prolec SA DECV
Guest	Bertrand	Poulin	Hitachi Energy
Guest	Baptiste	Pousset	Transformer Protector Corp
Guest	John	Pruente	SPX Transformer Solutions, Inc.
Member	Ion	Radu	Hitachi Energy
Guest	Timothy	Raymond	Electric Power Research Institute (EPRI)
Member	Scott	Reed	MVA
Guest	Sebastian	Rehkopf	Maschinenfabrik Reinhausen
Guest	Jonathan	Reimer	FortisBC
Guest	Clemens	Reiss IV	Custom Materials, Inc.
Guest	Juan	Reyes	Hitachi Energy
Guest	Michael	Richardson	Ameren
Guest	Diego	Robalino	Megger

Guest	Patrick	Rock	American Transmission Co.
Guest	Tim	Rocque	Prolec GE Waukesha
Guest	Zoltan	Roman	GE Grid Solutions
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
Guest	Lina	Sandsten	Hitachi Energy
Guest	Amitabh	Sarkar	Virginia Transformer Corp.
Member	Daniel	Sauer	EATON Corporation
Member	Alan	Sbravati	Hitachi Energy
Guest	Alaor	Scardazzi	Siemens Energy
Member	Markus	Schiessl	SGB
Guest	Stefan	Schindler	Maschinenfabrik Reinhausen
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
Guest	Kabir	Sethi	Hitachi Energy
Member	Adam	Sewell	Quality Switch, Inc.
Guest	Jeremy	Sewell	Quality Switch, Inc.
Guest	Russell	Sewell	Quality Switch, Inc.
Guest	Abdul Majid	Shaikh	Delta Star Inc.
Member	Hemchandra	Shertukde	University of Hartford
Member	Stephen	Shull	BBC Electrical Services, Inc.
Guest	Andre	Simons	Cogent Power Inc.
Guest	Jonathan	Sinclair	Black & Veatch
Guest	Jason	Snyder	FirstEnergy Corp.
Guest	Yong Tae	Sohn	Hyosung HICO
Member	Sanjib	Som	Pennsylvania Transformer
Guest	Mauricio	Soto	Hitachi Energy
Member	Mike	Spurlock	Spurlock Engineering Services, LLC
Member	Fabian	Stacy	Hitachi Energy
Member	Brad	Staley	Leeward Energy
Member	Markus	Stank	Maschinenfabrik Reinhausen
Guest	Hampton	Steele	Tennessee Valley Authority
Guest	Charles	Sweetser	OMICRON electronics Corp USA
Guest	Craig	Swinderman	Mitsubishi Electric Power Products
Guest	Ali	Syed	ComEd

Member	Janusz	Szczechowski	Maschinenfabrik Reinhausen
Guest	Matthew	Sze	OMICRON electronics Corp USA
Member	Troy	Tanaka	Burns & McDonnell
Guest	Marc	Taylor	JFE Shoji Power Canada Inc.
Guest	Ed	teNyenhuis	Hitachi Energy
Guest	Andreas	Thiede	Highvolt
Guest	Scott	Thomas	Hitachi Energy
Guest	Ryan	Thompson	Burns & McDonnell
Guest	Timothy	Tillery	Howard Industries
Guest	Anar	Tleoukoulov	Qualitrol
Guest	Lina	Tong	TK Transformer & Switchgear
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Guest	Olivier	Uhlmann	Reinhausen Canada Inc.
Vice-Chair	Alwyn	Van Der Walt	Electrical Consultants, Inc.
Guest	Cole	Van Dreel	American Transmission Co.
Member	Ajith	Varghese	Prolec Energy
Member	Jason	Varnell	Doble Engineering Co.
Guest	Robert	Vary	Reinhausen Manufacturing
Member	Rogerio	Verdolin	Verdolin Solutions Inc.
Guest	Karsten	Viereck	Maschinenfabrik Reinhausen
Guest	Krishnamurthy	Vijayan	PTI Transformers
Guest	Dharam	Vir	Prolec GE
Member	Richard	vonGemmingen	Dominion Energy
Member	Pragnesh	Vyas	Sunbelt-Solomon
Guest	Alan	Washburn	Burns & McDonnell
Member	Joe	Watson	JD Watson and Associates Inc.
Guest	Eric	Weatherbee	PCORE Electric
Member	Bruce	Webb	Knoxville Utilities Board
Guest	Matthew	Weisensee	PacifiCorp
Guest	Drew	Welton	Intellirent
Guest	Peter	Werelius	Megger
Member	Daniel	Weyer	Monolith
Member	William	Whitehead	H2scan Corporation
Guest	Christopher	Whitten	Hitachi Energy
Guest	Trenton	Williams	Advanced Power Technologies
Member	Jeffrey	Wright	Duquesne Light Co.
Guest	Kwasi	Yeboah	GE Energy Management
Member	Joshua	Yun	Virginia Transformer Corp.
Member	Peter	Zhao	Hydro One
Member	Kris	Zibert	Allgeier, Martin and Associates
Member	Waldemar	Ziomek	PTI Transformers

Attachment K.2

AGENDA

Power Transformers Subcommittee
IEEE PES Transformers Committee
Wednesday, October 25th, 2023, 1:30-2:45 PM CST, Century C (BR)
In Person – Welcome All

Ryan Musgrove – Chair, Alwyn VanderWalt – Vice Chair, Weijun Li - Secretary

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
    a. WG Revision of C57.131, Tap Changers..... Craig Colopy
        i. Monday Oct 23rd, 9:30-10:45 – Liberty (BR)
    b. WG C57.156, Guide for Tank Rupture Mitigation..... Peter Zhao
        i. Monday Oct 23rd, 9:30-10:45 – Century A (BR) – **NOTE: 1st Working Group Meeting**
    c. WG Revision of C57.116, GSU Transformers (Completed 2022 – no meeting)..... Weijun Li
    d. WG Class 1E Transformer for Nuclear Power gen Std. 638 ..... Craig Swinderman
        i. Monday Oct 23rd, 11:00-12:15 – Shawnee/Mission (BR) **NOTE: 1st Working Group Meeting**
    e. WG C57.135, Guide for Phase shifting Transformers.....Ewald Schweiger
        i. Monday Oct 23rd, 1:45-3:00 – Roanoke (BR)
    f. WG Revision of C57.143, Monitoring Guide ..... Mike Spurlock
        i. Monday Oct 23rd, 3:15-4:30 – Century A (BR)
    g. WG Revision of C57.125, Failure Investigating and Reporting ..... Hakan Sahin
        i. Monday Oct 23rd, 4:45-6:00 – Century A (BR)
    h. WG C57.170, Condition Assessment Guide ..... Kumar Mani
        i. Tuesday Oct 24th, 8:00-9:15 – Century A (BR)
    i. WG C57.157, Guide for Life test of Switch Contacts..... Adam Sewell
        i. Tuesday Oct 24th, 8:00-9:15 – Liberty (BR) **NOTE: 1st Working Group Meeting**
    j. WG Revision of C57.150, Transportation Guide (No onsite meeting)..... Greg Anderson
    k. TF C57.17, Standard Requirements for Arc Furnace Transformers.....Dom Corsi
        i. Tuesday Oct 24th, 11:00-12:15 – Shawnee/Mission (BR)
    l. WG C57.107, Transformer Volts per Hertz ..... Joe Watson
        i. Tuesday Oct 24th, 1:45-3:00 – Liberty (BR)
    m. TF C57.93, Installation and Maintenance Guide..... Scott Reed
        i. Tuesday Oct 24th, 3:15-4:30 – Century A (BR)
    n. Liaison to PC57.93a – Installation and Maintenance Guide ..... Scott Reed
    o. WG C57.153, Guide for Paralleling Transformers..... Mark Tostrud
        i. Tuesday Oct 24th, 4:45-6:00 – Liberty (BR) **NOTE: 1st Working Group Meeting**
    p. Liaison to Entity PAR for Twin Modeling..... Brian Sparling
8. Old business
    a. Transformer Seismic Concerns – IEEE 693 "Amendment" – Eric Weatherbee

b. Entity PAR Request "Guide for Power Transformers for Low-frequency (20Hz) Power Transmission"
c. Discussion on the creation of a new IOT Document – Sanjib Som

9. New business
10. Adjournment

Power Transformers Subcommittee
Working Group Report

Document #:	**C57.131**
Document Title:	**Standard Performance Requirements and Test Methods for Tap-changers**

Chair:	**Craig A. Colopy**	**Vice-Chair**	**Axel Kraemer**
Secretary	**Adam M. Sewell**	**Percent Complete**	**99%**

Current Draft Being Worked On:	**1.3**	**Dated:**	**October 2023**
PAR Expiration Date:	**December 31, 2024**		

Meeting Date:	**23 October 2023**	**Time:**	**9:30am-10:45am**
Location:	**Kansas City, MO, USA**		

1.	**Attendance:**	**2.**	**Members**	**23 out of 38**
3.		**4.**	**Guests**	**56**
5.		**6.**	**Guests Requesting Membership**	**4**
7.		**8.**	**Total***	**79**

*** Attendance list for this meeting is shown at end of meeting minutes**

Meeting Minutes / Significant Issues / Comments:

1. Meeting was called to order at 9:30am, October 23, 2023 at THE WESTIN AT CROWN CENTER KANSAS CITY, MO, USA, Room: Liberty.
2. Distribution of attendance sheets
    a. If you didn't receive an email from this working group before this meeting or are not on the attendance sheet, please send an email to adamsewell@ieee.org with the subject: C57.131 EMAIL to be added to the C57.131 WG email list
3. No comments from WG about IEEE Essential Patent Statement and Copyright Policy
4. Quorum Check / Introductions
    a. Introductions were made by name and affiliation
    b. 23 members out of 38 were in attendance – QUORUM MET
    c. Member requests can be sent to ADAMSEWELL@IEEE.ORG
        i. New Membership to WG is closed since ballot has been out
5. Approval of 2023 Fall Agenda
    a. Motion – J.Sewell, 2nd-T.Dauzat
    b. No opposition to unanimous approval-MOTION APPROVED

6. Approval of minutes from Spring 2023 Milwaukee Meeting
    a. Motion – M.Ferreira, 2nd-M.Stank
    b. No opposition to unanimous approval-MOTION APPROVED
7. OLD BUSINESS
    a. Chair reviewed results of Initial Ballot of Draft 1.2 - Open Date: 11Apr2023 / Close Date: 11May2023
        i. Approval rate 94% (95 ballots).
    b. Keep the following notes for a future joint(dual logo) revision of IEC 60214-1
        i. Section 6.1.15 Protection against access to hazardous parts - check if there is an equivalent designation in NEMA 250 for IP1X
            1. Based on investigation Chair found no identical designation in Nema 250.
        ii. Section 7.2.2 Temperature rise. Some discussion is warranted regarding the difference between maximum contact temperatures of OLTC and DETC along with defining contact test temperature methodology to normalize testing. This could include switch orientation, liquid volume and parameters you have to prevent unwarranted advantageous results.
        iii. Table 3 values for switching impulse test values
            1. Current IEEE and IEC standards do not list switching impulse values less than 100kV. Switching impulse values will be looked at for less than 100kV. 69kV was a value brought up in the 3/28/22 meeting.
        iv. From Attila Gyore-(4.1) Table 1, Note 2; the value of 105C is for mineral insulating oil. Though the text indicates, it should be mentioned here that with other liquids the maximum value can be changed, see the new IEEE C57.154. Incorporate the option with other liquids based on IEEE C57.154
        v. From Attila Gyore-(1.2) There will be a new IEEE Guide, IEEE C57.166, which contains all the main dielectric liquids. However, this is a new document and will be in Ballot stage soon. If the IEEE C57.166 is in 1.2, it needs to be in the Normative References too.
        vi. From Attila Gyore-(5.1.4) Please insert a new clause: 5.1.4.4 Less-flammable liquids (Less-flammable liquids can be used to reduce the fire risk, where applicable)
        vii. From Attila Gyore-(5.2.7.2) The 10 ppm increase in gases is valid for mineral oil and synthetic ester. In case of natural ester an increase of 100-200ppm in Ethane and 200-300ppm in hydrogen is normal during a heat run test of a power transformer. The statistical value for natural ester in OLTC will be determined in C57.139. Please state in this part that the value of 10ppm is valid for mineral oil and synthetic ester and for natural ester higher values can be seen.
        viii. From Attila Gyore-It would be addressed if the compartment or any part of the tap-changer is filled with different liquid to the main tank. In a new IEC

standard this will be implemented: "Where K or L class liquid is used as the internal cooling medium and identified as such on the nameplate, but a lower fire point liquid is present in another part of the transformer for example in a tap-changer this shall be clearly indicated on the nameplate." A similar paragraph should be written here too. Write a paragraph about different liquid (typically mineral insulating liquid) used in tap-changer to main tank (typically ester liquid)

8. NEW BUSINESS
    a. Reviewed Disapprove comments with working group while providing disposition status and detail
        i. Agreement from WG on disposition of all comments was obtained
    b. Recirculation ballot for Draft 1.3 planned before end of 2023
    c. Future revision will consider working with IEC on a dual logo standard using 60214-1 and C57.131 documents
9. Next meeting: NO PLANS FOR ANOTHER WG MEETING AT THIS TIME. PLAN IS TO WORK ON DUAL LOGO STANDARD WITH IEC 60214-1 & IEEE C57.131 IN FUTURE.
10. Close of meeting – 9:50am
    a. Motion – D.Schwartz, 2nd – M. Ferreira. No opposition to unanimous approval. ADJOURNED

Submitted by: Craig A, Colopy Date: Nov 1, 2023

Meeting Attendance Oct 23, 2023 (RM1 = Request Membership 1st time, RM2=Request Membership 2nd time):

Last Name	First Name	Company (Affiliation)	Role
Adams	Kayland	Prolec GE Waukesha	Guest
Aikens	Tom	VTC	Guest
Alahmed	Alex	Evergy	Guest
Aldenlid	Jennie	Hitachi Energy	Member
Allison	Robert	Dominion Energy	Guest
Arevalo	Edmundo	Bonneville Power Administration	Guest
Blaszczyk	Piotr	Specialty Transformer Components LLC	Member
Bolar	Sanket	Oncor	Guest
Colopy	Craig	Consultant	Member-Chair
Cruz Valdes	Juan Carlos	Prolec GE	Member
Dauzat	Thomas	AEP	Member
Delgado	Gabriel	Invenergy	Guest
Dix	Larry	Quality Switch, Inc.	Member
Dominguez	Raul	WEG Tranformers	Guest
Ermakov	Evgenii	Hitachi Energy	Guest
Espindola	Marco	Hitachi Energy	Guest
Faur	Florin	Prolec GE Waukesha	Member
Ferreira	Marcos	Quanta Technology	Member
Frye	Richard	Eaton	Guest
Gardner	James	Prolec GE Waukesha	Guest-RM2
Garza	Hector	Orto de Mexico	Guest
Gustavsson	Niklas	Hitachi Energy	Member
Gyore	Attila	M&I Materials Ltd	Member
Heinzig	Peter	Weidmann	Guest
Imece	Ali	PowerServ	Guest
Jarosz	Patrycja	IEEE SA	Guest
Juchem	Kevin	Hitachi Energy	Guest
Katz	Nathan	PacifiCorp	Guest
Kay	Jim	STC	Guest
Kennedy	Gael	GR Kennedy & Associates LLC	Guest
Kessler	Stacey	Ulteig Engineers	Guest-RM2
Knapp	Evan	Eaton	Guest
Mangubat	Darrell	Siemens Energy	Guest
Martinez	Alberto	WEG USA	Guest
Miller	Philip	Memphis Light, Gas and Water Division	Guest
Mills	Francis	Power Engineers	Guest-RM2
Montanha	Juliano	Siemens Energy	Guest
Munoz Molina	Martin	Orto de Mexico	Member
Naderian	Ali	BBA	Guest
Naranjo	Volney	Megger	Guest

Last Name	First Name	Company (Affiliation)	Role
Neild	Kristopher	Megger	Member
Newbill	Mark	Hitachi Energy	Guest
Park	Hoony	ILJIN Electric	Guest
Plascencia	Miguel	PG&E	Guest
Ploetner	Chris	Siemens Energy	Guest
Pruente	John	Prolec GE Waukesha	Member
Raymond	Timothy	Electric Power Research Institute (EPRI)	Guest
Rehkopf	Sebastian	Maschinenfabrik Reinhausen	Member
Reimer	Jonathan	Fortis BC	Guest
Saad	Mickel	Hitachi Energy	Guest
Sandsten	Lina	Hitachi Energy	Guest-RM2
Schindler	Stefan	Maschinenfabrik Reinhausen	Member
Schleismann	Eric	Southern Company Services	Member
Schwartz	Dan	Quality Switch, Inc.	Member
Sewell	Adam	Quality Switch, Inc.	Member-Secretary
Sewell	Jeremy	Quality Switch, Inc.	Member
Sewell	Russ	Quality Switch, Inc.	Guest
Shaikh	Abdul Majid	Delta Star Inc.	Guest
Sinclair	Jonathan	Black & Veatch	Guest
Singh	Kushal	ComEd	Guest
Smith	Jimmy	Howard Industries	Guest
Snyder	Jason	First Energy	Guest
Sohn	Yongtae	Hyosung Hico	Guest
Stank	Markus	Maschinenfabrik Reinhausen	Member
Sweetser	Charles	Omicron	Guest
Szczechowski	Janusz	Maschinenfabrik Reinhausen	Guest
Tanaka	Troy	Burns & McDonnell	Guest
Thomas	Scott	Hitachi Energy	Guest
Tillery	Timothy	Howard Industries	Member
Uhlmann	Olivier	Reinhausen Canada	Guest
Vanderwalt	Alwyn	ECI	Guest
Viereck	Karsten	Maschinenfabrik Reinhausen	Guest
Weisensee	Matt	PacifiCorp	Guest
Welton	Drew	Intellirent	Guest
Werelius	Peter	Megger	Guest
Whitehead	William	H2scan Corporation	Member
Whitten	Christopher	Hitachi Energy	Member
Young	Samuel	Hitachi Energy	Guest
Ziger	Igor	Koucar	Guest

Attachment K 4.2

Title: WG Guide for Tank Rupture Mitigation C57.156-2026
Time: 9:15 AM- 10:45 AM, Monday, Oct 23, 2023
Place: Westin at Crown Center, Kansas City, MO

Meeting Minutes:

At 9:15 AM, Chair called the meeting to order.

Chair welcomed the members and guests, followed with introductions.

There were 70 participants, and 33 requested for WG membership.

The meeting in Kansas City was the 1st WG meeting for revision of the Standard.

Chair briefed about the scope of the work for this WG.

As the very 1st meeting as WG, Strategic Planning was the focus for revision process:

- A standard template was created as attached for proper documentation of comments and proposals. It is requested comments/changes/proposals shall be recorded in the template.
- Two years or 4 meetings are planned for collection of changes and proposals, and one year or two meetings for completion of the draft document.
- A secretary position is open, and volunteer requested.

Joe Watson suggested technical presentations in future meetings are helpful for the participates to better understand the subject, and the chair agreed.

Chair is going to check and verify the contents in the new PAR approved by NesCom, making sure the contents are in line with those reached during the TF meetings.

A working document will be posted on the WG website once available.

No claim was reported during the meeting on the issues related to IEEE Essential Patent and Copyright Policy.

WG will meet in 2024 Spring Meeting in Vancouver.

Meeting adjourned at 10:15AM.

Reported by:
Peter Zhao, P.Eng.
WG Chair
Nov 04, 2023

Attachments:

#1 - New PAR
Title:

IEEE Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors

Scope:

This guide describes measures that may be taken to help mitigate rupture and uncontrolled insulating liquid release from energized liquid-immersed power transformers' and reactors' tanks and components due to internal electrical faults.

Purpose:

This guide describes the current state of knowledge of the relationship between tank rupture and such variables as arc energy level, hydraulic pressures, and tank pressure withstand. Also described are various measures that transformer users and manufacturers may take in system design, product design, monitoring devices, signaling devices, and insulating fluid choices that can help mitigate tank rupture.

#2 – Standard Template for Comments and Proposals

Comment #	Name	Email	Phone	Affiliation	Page	Subclause	Line	Comment	Change Proposed	Disposition Status (accepted/rejected/revised)	Disposition Detail

#3 – Attendance List

Attendance List - Kansa City

Name	Affiliation	Membership (yes or no)
Alahmed Alex	Energy	yes
Alfons Schrammel	Siemens Energy	yes
Alireza Gorein	Black & Veatch	yes
Amitabh Sarkar	Virginia Transformer	yes
Anarea Ynui	Siemens Energy	no
Anastasia O'Malley	Con Edison NY	yes
Andrea Steinman		no
Andy Speegle	ENTERGY	no
Andy Steineman	Delta Star	no
Baptiste Pousset	Transformer Protector	yes
Bertrand Poulin	Hitachi Energy	no
Bob Kelley	NASS	no
Brad Staley	Leeward Energy	yes
Christopher Johnson	Oncor	Yes
Daniel Weyer	Monolith	yes
David Calitz	Siemens Energy	yes
David Murray	TVA	yes
Derek Hollrah	Burns&McDonnell	no
Dominic Pollaro	NASS	no
Eduardo Garcia	Siemens Energy	yes
Edvardo Tolcachir	TTE.S.A	yes
Edward Huang	Fortune Electric	yes
Elizabeth Bray	Southern Company	no

Eric Davis		no
Everton De Oliveira	Siemens Energy	yes
Ewald Schweiger	Siemens Energy	yes
Filip Mikulecky	Siemens Energy KPT	no
Hakim Dulac	APT	yes
Hugo Avila	Hitachi Energy	yes
Jacob Eshenroder	Burns&McDonnell	no
Joe Nims	Allen& Hoshall	no
Joe Watson	JDWatson & Associates	yes
Jose Luis Machain	Prolec GE	no
Joshua Yun	Virginia Transformer	yes
Juan Alfredo Carrizales	Prolec GE	no
Juan Reyes Perez	Hitachi Energy	no
Junho Lee	Hyundai Electric	no
Kannan veeran	Virginia Transformer	no
Klaus Kock	Trench Austria	no
Koffi Akakpo	Burns&McDonnell	no
Krishnamurthy Vijayan	PTI Transformers	yes
Kuma Mani	Duke Energy	yes
Luc Loiselle	Tetra Tech	no
Luis Gonzalez	Evergy	no
Maadh Alsaad	Evergy	no
Mauricio Soto	Hitachi Energy	no
Michael Botti	Hyosung HICO	yes
Mike Millor	Siemens Energy	yes
Moses Manzano	Hyosung HICO	yes
Nitesh Patel	Hyundai Power	no
Onome Avanoma	MJ Consulting	no
Peter Zhao	Hydro One	yes
Raines Frotscher	Reinhausen Manufacturing	no
Rakesh Rathi	Virginia Transformer	no
Robert Middleton	RHM International	yes
Robert Vary	Reinhausen Manufacturing	no
Roger Hayes	GE Ver Nova	yes
Rogerio Verdolin	Consultant	yes
Ronald Hernandez	Doble	no
Samuel Brodeur	Hitachi Energy	yes
Sanjay Patel	Royal Smit	no
Sanjib Som	PTTE	yes
Sean Barker	Hitachi Energy	no
Stephen Antosz	Consultant	no
Tim Rocque	Prolec GE Waukesha	no
Vason Snyder	First Energy	no
Verena Pellon	NEXTERA	yes
Vivek Bhatt	Prolec GE Waukesha	yes
Vivian Chan	Hitachi Energy	no
Waldemar Ziomek	PTI Transformers	yes

PAR Study Group/ TF for revision of IEEE 638-2013 "Qualification of Class 1E Transformers for Nuclear Power Generating Stations"

MEETING MINUTES

Date: Monday, October 23, 2023 – 11:00 am to 12:15 pm.

The meeting was called to order at 11:00 am by Chair Craig Swinderman

There were a total of 26 people present, 3 members and 23 guests. Attendance was taken with a paper roster. 8 of the guests requested membership. A list of attendees is included at the end of these minutes.

Chair's Remarks

A call for essential patent claims was made. No patent claims were identified. The IEEE Copyright Policy was also shown.

Meeting Agenda

1. Welcome & Call to Order
2. Question, Essential Patent Issues, and IEEE Copyright Policy
3. Review of IEEE 638-2013
4. New Business

Topics discussed:

A PAR request has been submitted to revise IEEE 638 on 10/11/2023. The PAR is on the Dec. 5-6, 2023 NesCom agenda for review and approval by SASB.

It was highlighted to the group that IEEE 638 Standard is closely related to the other standards IEEE/IEC 60780-323 (2016) and IEEE/IEC 60980-344 (2020). Both of these standards have been revised since the latest version of IEEE 638 was published.

Once the PAR is approved in December 2023, a team of volunteers from the working group will review the changes made to these two existing standards to determine what changes will need to be added in the next revision of IEEE 638.

A virtual Working Group meeting will be scheduled in the January 2024 timeframe to review and discuss the proposed changes. After this virtual meeting, the

Working Group will begin drafting the revised IEEE 638 document prior to the next in-person Working Group meeting in the Spring of 2024 in Vancouver, BC.

New Business

There was no New Business discussed during the meeting.

The meeting was adjourned at 12:00 pm. The group plans to meet as a WG at the Spring 2024 Meeting in Vancouver, BC.

Best regards,
Craig Swinderman
Chair – IEEE 638

List of Meeting Attendees at Fall '23 Meeting, including affiliation & voting member status.

Name	***Company***	***Role***
Craig Swinderman	Mitsubishi Electric Power Products, Inc.	Member
Ryan Musgrove	Oklahoma Gas & Electric	Member
Alex Alahmed	Evergy	Member
Tommy Nunn	JST	Guest
Joseph Tedesco	Hitachi Energy	Guest
Dave Stankes	3M	Guest
Shawn Nunn	Hitachi Energy	Guest
Yuan Guace	Hitachi Energy	Guest
Juan Reyes Perez	Hitachi Energy	Guest

Name	***Company***	***Role***
Kush Arora	Reinhausen	Guest
Bojan Popovic	Koncar Power Transformer	Guest
Robert Bracun	Koncar Power Transformer	Guest
Ali Imece	Power Serv	Guest
Touc Reiss	Custom Materials	Guest
Jinesh Malde	M&I Materials Inc.	Guest
Elizabeth Bray	Southern Company	Guest
O. Koffi Akakpo	Burns & McDonnell	Guest
Jason Perkins	Moelu Sales	Guest
Alfredo Carrizales	Prolec GE	Guest
Kabiy Sethi	Hitachi Energy	Guest
Robert Allison	Dominion Energy	Guest
Daniel Weyer	Monolith	Guest
Javier Arteaga	Hitachi Energy	Guest
Hemchandra Shertukde	University of Hartford	Guest
Ion Radu	Hitachi Energy	Guest

Name	***Company***	***Role***
Richard Von Gemmingen	Dominion Energy	Guest
Patrycja Jarosz	IEEE SA Staff	Observer

Power Transformers Subcommittee
Working Group PC57.135 Report

Document #: C57.135 (Dual logo IEC / IEEE 60076-57-135)

Document Title: Guide for the Application, Specification, and Testing of Phase-Shifting Transformers

Chair: Ewald Schweiger **Vice-Chair** -

Secretary Richard von Gemmingen

Current Draft Being Worked On: 1.0 **Dated:** NA

Meeting Date: 2023-10-23 **Time:** 1:45PM – 3:00PM CDT

Attendance:

Members:	18
Guests:	37
Total:	55

Un-approved

Meeting Minutes of Fall 2023 IEEE Kansas City Working Group Meeting:

1) Meeting was called to order at 1:45 PM (CDT) with Welcome & Chair's remarks
2) Status of IEEE/IEC collaboration was updated.
   a) The document up to now has not been a dual logo. A motion to create dual logo document has been made and IEC was informed with process started. (decided in the F22 meeting in Charlotte, NC)
   b) NWIP for 60076-57-135 was created and distributed with in IEC (PNW 14-1102-ED1)
   c) Kevin Juchem is project leader at IEC
   d) A modified IEEE PAR will need to be submitted to update the PAR to match the title of IEC NWIP ***Technical*** *guide**line** for the Application, Specification, and Testing of Phase-Shifting Transformers*
   e) PAR number will need to be updated to IEC/IEEE 60076-57-135
3) Ewald updated next steps and needs
   a) PRC committee liaison to C37.245 protection guide is Michael Thompson
   b) From last meeting Ewald checked with IEEE and it is ok to use graphs in the definitions section or take graphs from other standards, IEC permission will be needed for IEC content.
   c) Ewald put out a call for volunteers to compare definitions of C57.135 and C37.245
4) First virtual IEC/IEEE meeting took place Sept 19,2023.
5) Call for Essential Patents.
   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.

6) Copyright policy.
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.

7) Quorum Check
Quorum was achieved with 18 of 24 members present.

8) Approval of the Agenda of the last meeting September 19, 2023 (virtual)
Markus Stank made motion to approve Agenda, Douglas McCullough provided second.
Motion was carried unanimously with no objections or abstentions.

9) Approval of the September 2023 Virtual meeting minutes
Kurt Kaineder made motion to approve Agenda, Markus Stank provided second.
Motion was carried unanimously with no objections or abstentions.

10) Summary table of Clause 4 of C57.135 review by Alfons Schrammel and Sebastian Rehkopf was presented and many points of discussion were had with the working group. E.g.

a) Alfons noted that he had found some errors with diagrams

b) Joe Watson indicated he still had old electronic files for the diagrams from 2011 if needed.

c) Alfons suggested that Advance & Retard diagrams should be two separate diagrams instead of current all in one diagram.

d) Formulas were questioned if there was an error. Discussion indicated formula should be load voltage + voltage drop not load voltage * voltage drop. It was pointed out the phasor diagram clarifies this

e) 4.6.1 Sebastian Rehkopf reviewed. Figure 14 and noted something mixed up on course arrangement vs. ARS arrangement. Sanjay Patel noted and discussion was noted there probably is a mixing of PST terminology with regular transformer language

f) 4.8.1 Alfons found phasor diagram did not line up and should be corrected. Sanjay Patel suggested adding polarity marks

11) Clause 5 Service condition reviewed by Eric Davis, Sanjay Patel, Joe Watson and Kevin Juchem

a) Kevin Juchem discussed if 5.4 belongs in the guide. He was unable to locate a dedicated standard for this on IEC side

b) Discussion noted that today likely more protections schemes are available than when this was written. If schemes are already covered in C37.245 then not needed in this document

c) Sanjay Patel stated that every user likely has their unique schematics, guide should only cover basics

d) Clause 5.4.2 secondary protective device has changed and needs review. Ewald to discuss with protection S.C.

12) Kevin Juchem provided update on Clause 9 Control Systems

a) Kevin noted this section is 3 pages with lots of sub clauses and questioned if it is TOO specific.

b) Suggestion is to reduce it, also it seems not to be in correct place in guide

c) Discussion on power flow, boost – buck, phasor rotation outside network etc.

d) Markus Stank asked if this is direct link to protection

e) Joe Watson also pointed out limitations on available tap positions

f) Karsten Viereck indicated a need to discuss changes and types of controllers

g) Ewald Schweiger suggested creating a task force to work through this section and review what should remain and what to remove, also noting that this guide could be seen as educational.

13) Clause 10 Testing of PSTs and Clause 11 Tolerances was reviewed by Jos A.M.Veens and presented by Luc Dorpmanns

a) Section 10,2,2,1 it is not clear if switching impulse testing is required

b) Temperature rise test, need to capture differences

c) Test windings

d) 10.2.1 Special dielectric for bypass switch testing.

e) Discussion on how to perform switching impulse test on series winding

f) Phasor group no-load phase angle – update

g) Tolerance of device accuracy discussed for small angles

h) 11.3. Alfons questioned what the purpose of accuracy on such small angles is, Luc Dorpmanns indicated it can be reviewed

i) Ewald indicated we cannot contradict other standards, Luc Dorpmanns indicated we can elaborate

j) General: Kevin Juchem pointed out the use of “shall” in the guide.
→ Editorial check needed

14) Old Business
None

15) Adjournment of meeting
Meeting was adjourned at 11:00 AM EDT.

16) Next meeting is in Vancouver, plus virtual teams meeting(s) will be conducted in between
→ Invitations will follow

17) List of attendees for this meeting:

Name	Last name	Given name	Affiliation	Status
Aldenlid Jennie	Aldenlid	Jennie	Hitachi Energy	G
Barker Sean	Barker	Sean	Hitachi Energy	G
Bhardway Rahul	Bhardway	Rahul	Burns & McDonnell	G
Brodeur Samuel	Brodeur	Samuel	Hitachi Energy	G
Calitz David	Calitz	David	Siemens Energy	G
Colopy Craig	Colopy	Craig	Retired - General Interest	G
Craven Mike	Craven	Mike	Qualus Power Services	G
Cruz Valdes Juan Carlos	Cruz Valdes	Juan Carlos	Prolec GE	G
Davis Eric	Davis	Eric	Independent Consultant	M
Dominguez Ravi	Dominguez	Ravi	WEG Transformers	G
Dorpmanns Luc	Dorpmanns	Luc	Royal SMIT Transformers B.V.	G
Ellis William	Ellis	William	Ameren	G
Eschenroder Jacob	Eschenroder	Jacob	Burns & McDonnell	G
Gonzales Saiz Lusis	Gonzales Saiz	Luis	Evergy	G
Gupta Ravi	Gupta	Ravi	Megger	G
Gustavsson Niklas	Gustavsson	Niklas	Hitachi ABB Power Grids	M
Heinzig Peter	Heinzig	Peter	Weidmann Electrical Technology	G
Hoony Park	Hoony	Park	Iljin Electric	G
Imece Ali	Imece	Ali	Power Serv	G
Juchem Kevin	Juchem	Kevin	Hitachi Energy	M

Kaineder Kurt	Kaineder	Kurt	Siemens Energy	M
Katapalli Thrinadha	Katapalli	Thrinadha	Virginia Transformer Corporation	M
Knapp Evan	Knapp	Evan	EATON Corporation	G
Koeck Klaus	Koeck	Klaus	Trench	G
Manzano Moses	Manzano	Moses	Hyosung - HICO	G
McCullough Douglas	McCullough	Douglas	Maxima / Hyundai	M
Miller Michael	Miller	Michael	Siemens Energy	M
Musgrove Ryan	Musgrove	Ryan	OG+E	M
Pandza Tihomir	Pandza	Tihomir	Koncar Power Transformers	G
Patel Sanjay	Patel	Sanjay	TD-Smit Transformers	M
Pellon Verena	Pellon	Verena	Florida Power & Light	M
Ploetner Christoph	Ploetner	Christoph	Siemens Energy	M
Pousset Baptiste	Pousset	Baptiste	Transforerm Protection Co	G
Prevost	Prevost	Thomas	Weidmann Electrical Technology	G
Rehkopf Sebastian	Rehkopf	Sebastian	Maschinenfabrik Reinhausen GmbH	M
Sarkar Amitabh	Sarkar	Amitabh	Virginia Transformer Corporation	G
Schindler Stefan	Schindler	Stefan	Maschinenfabrik Reinhausen GmbH	G
Schrammel Alfons	Schrammel	Alfons	Siemens Energy	M
Schweiger Ewald	Schweiger	Ewald	Siemens Energy	M
Scott Thomas	Scott	Thomas	Hitachi Energy	G
Snyder Jason	Snyder	Jason	First Energy	G
Stank Markus	Stank	Markus	Maschinenfabrik Reinhausen	M
Thiede Andreas	Thiede	Andreas	Highvolt -	G
Van Der Walt Alwyn	Van Der Walt	Alwyn	Electrical Consultants, Inc.	G
Vary Robert	Vary	Robert	Maschinenfabrik Reinhausen	G
Viereck Karsten	Viereck	Karsten	Maschinenfabrik Reinhausen	G
Vir	Vir	Dharam	Prolec GE	G
von Gemmingen Richard	von Gemmingen	Richard	Dominion Energy	M
Washburn Alan	Washburn	Alan	Burns & McDonnell	G
Watson Joe	Watson	Joe	JD Watson and Associates Inc.	M
Weisensee Matt	Weisensee	Matt	Pacificorp	G
White Joe	White	Joe	Power Engineers	G
Whitehead William	Whitehead	William	H2Scab	G
Williams Trenton	Williams	Trenton	Advanced Power Technologies	M
Zaman Malia	Zaman	Malia	IEEE SA	G

18) Guests requesting: membership
Of the 37 guests, there were 8 new membership requests.

Next meeting: March 2024 in Vancouver, BC - Canada

Created by: Secretary Richard von Gemmingen & Ewald Schweiger

Date: November 8, 2023

Attachment K 4.6

C57.143 – IEEE Guide for Transformer Monitoring
Monday, October 23, 2023 Kansas City, MO
Minutes of WG Meeting

The meeting was called to order at 3:15 PM by Chair Mike Spurlock. Vice-Chair Poorvi Patel was present. Secretary Elizabeth Bray (writer of Minutes) was also present.

There were 45 of 96 members present. There were 50 guests in attendance. A membership quorum was not achieved. The attendance for this meeting was as follows:

- Number of Members in Activity = 96
- Number of Members Present = 45
- Percentage of Members Present = 47%
- Number of attendees = 95

A List of Meeting Attendees that signed the rosters is provided below.

Last Name	First Name	Role
Arora	Kush	Guest
Bargone	Gilles	Member
Benach	Jeff	Member
Blaszczr	Piotr	Guest
Bolar	Sanket	Guest
Bray	Elizabeth	Member
Calitz	David	Member
Chambers	Stuart	Member
Cheim	Luiz	Member
Colopy	Craig	Guest
Craven	Michael	Guest
Da Silva	Roberto Ignacio	Guest
Delgado	Gabriel	Guest
Dozi	Paul	Guest
Draper	Zachary	Guest
Dulac	Hakim	Member
Elliott	Will	Guest
Ermakov	Evgenii	Guest
Espindola	Marco	Member
Faur	Florin	Member
Frimpong	George	Member
Gaun	Alexander	Guest
Gonzales Saiz	Lois	Guest
Gross	Detlev	Member
Guner	Ismail	Member
Gustavsson	Niklas	Member
Gyore	Attila	Guest
Hayes	Roger	Member

Hoffman	Saramma	Member
Hoffman	Gary	Member
Hollrah	Derek	Member
Hoony	Park	Guest
Hugo	Avila	Guest
Kessler	Stacey	Member
Kulasek	Krzysztof	Member
Larochelle	David	Member
Lin	Jacky	Guest
Loiselle	Lua	Guest
Lopez-Fernandez	Xose	Member
Machain	Jose Luis	Guest
Mangubat	Darrell	Member
Mani	Kumar	Member
Martinez	Alberto	Guest
McBride	James	Member
Mellin	Toni	Guest
Miller	Michael	Guest
Morales-Cruz	Emilio	Member
Munoz Molina	Martin	Member
Naderian	Ali	Guest
Newbill	Mark	Guest
O'Malley	Anastasia	Member
Owen	John	Guest
Ozelan	Janks	Guest
Pagliuca	Vincenzo	Guest
Patel	Poorvi	Member
Portillo	Homero	Guest
Pruente	John	Member
Rathi	Rakesh	Guest
Reeder	Perry	Guest
Rehkopf	Sebastian	Guest
Reimer	Jonathan	Guest
Robalino	Diego	Guest
Rock	Patrick	Guest
Rocque	Tim	Guest
Rossini	Yuri	Guest
Saad	Mickel	Member
Sarkar	Amitabb	Guest
Sbravati	Alan	Guest
Scardazzi	Alcor	Guest
Schindler	Stefan	Guest
Shenroder	Jacob	Guest

Sinclair	Jonathan	Member
Soeller	Markus	Guest
Soto	Mauricio	Member
Spurlock	Mike	Member
Staley	Brad	Member
Stank	Markus	Member
Sweetser	Charles	Member
Szczechowski	Janusz	Member
Sze	Matthew	Guest
Thompson	James	Guest
Thompson	Ryan	Member
Tleourollov	Anar	Guest
Tostrud	Mark	Member
Trifunoski	Risto	Guest
Van Der Walt	Alwyn	Member
Vary	Robert	Guest
Verdolin	Rogerio	Member
Viereck	Karsten	Guest
Watson	Joe	Member
Webb	Matthew	Member
Welton	Drew	Member
White	Joe	Guest
Whitehead	William	Member
Williams	Trenton	Member
Woods	Deanna	Member
Yazdani	Mana	Member
Young	Samuel	Guest

Agenda

1. Welcome & Introduction
2. Call for Patent Disclosure/Review Copyright Policy/Review Individual Participation Process
3. Chair Remarks
4. Quorum Check
5. Approval of Agenda
6. Approval of Spring 2034 Meeting Meetings
7. Status of PAR Extension/Ballot for the final draft
8. Discussion/entertain motions.
9. Next Steps
10. New Business

Chair Mike Spurlock asked of a call for patents disclosure was made and no patent claims were reported.

Chair Mike Spurlock reviewed the IEEE Copyright policy and the individual participation as to act and vote based on your individual expertise.

Chair Mike Spurlock remarks were made regarding the accomplishments of 2023. On January 31 the approval request to proceed to ballot was made to the subcommittee, on March 3 it was approved, on May 11 the ballot group was formed with around 200 people who signed up. The ballot was circulated on May 12 and closed on June 11. The ballot had an 86% response rate and 93% approval rate.

Four resolution groups were formed to resolve 676 comments received during the ballot. 84% have been reviewed and accepted/accepted with revision, 8½% have been rejected and 7½% remain to be processed.

A 2-Year PAR extension was granted September 21, 2023. The new PAR expiration date is Dec 31, 2025.

A quorum check was conducted, and it was determined after several attempts to check members that a quorum was not reached.

Next steps are to post after resolution groups are finished. Those who posted comments can then provide their feedback.

Next step will be to recirculate the ballot and publish.

Drew Welton asked for an update from the Spring 2023 meeting around the discussion around a tutorial for a future meeting to go over the guide. Those that volunteered to lead that effort (Sammy Bass & Brian Sparling) were not in attendance to give an update on the status of this effort.

Expect to go to ballot in January 2024.

This was likely our last meeting due to the ballot circulating in January and no need to meet after that time.

The meeting adjourned at 3:42pm.

Power Transformers Subcommittee
Working Group Report

Chair:	**Hakan Sahin**	**Vice-Chair**	**Thomas Melle**
Secretary	**Adam Sewell**	**Percent Complete**	**40%**

Current Draft Being Worked On: **1.0** **Dated:** **n/a**

PAR Expiration Date: **December 31, 2025**

Meeting Date: **23 October 2023** **Time:** **4:45pm – 6:00pm**

Location: **Kansas City, MO, USA**

Attendance:	**Members**	**33 of 41**
	Guests	**93**
	Guests Requesting Membership	**13**
	Total*	**126**

*** 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 23, 2023.

1. Administrative
    a. IEEE Patent Policy and Call for Patents
        i. No comments from group
    b. IEEE SA Copyright Policy
        i. No comments from group
    c. Review of agenda
        i. No comments from group
    d. Reminder on the purpose and the scope of the working group, and the timeline
        i. The expectation from this WG is to review and update the document as it expires on 12/31/2025.
        ii. Expected Date of submission of draft to the IEEE SA for Initial Standards Committee Ballot: May 2024. Projected Completion Date for Submittal to RevCom: Dec 2024
    e. Introductions of the attendees
        i. Attendance sheets were passed out. Name/affiliation was announced as attendees spoke during the meeting.
        ii. Secretary asked all who wanted on email distribution for the C57.125 Working Group to send him an email at: adamsewell@ieee.org
    f. Updated membership review and count for quorum

i. 41 members and 33 were counted as present. QUORUM ACHIEVED
ii. Attendance sheets after meeting completed showed 33 members attended.
iii. Members are expected to attend and stay in the meeting so business can be conducted.

g. Approvals of previous minutes and agenda:
i. Approval of the agenda
ii. Approval of the Spring_23 unapproved meeting minutes
iii. Motion to approve all shown – W.Binder, 2nd – S.Chambers
1. No objection to unanimous approval – ALL APPROVED

2. Old Business
a. Review the changes proposed for Section 4.2 Investigation flow chart
i. Discussion from the S23 meeting was to add "quality" to the tests.

Current Document:

4.2 Investigation flow chart

For many companies, it may be desirable to perform selected tests. Figure 1 has been developed to aid in the determination and investigation of a transformer failure. This flowchart forms the basis for this guide. The two starting points for this flowchart are (1) transformer tripped or malfunctioned, and (2) routine tests show deviation from past. Routine tests include those listed in Table 4 and Table 5.

The paths in the flowchart lead either to scrapping or returning to service. Prior to returning to service, it may be desirable to perform selected tests to verify suitability for service that includes the commissioning tests described in IEEE Std C57.152. Following return to service, it is suggested that the transformer be monitored by periodic electrical tests and tests that include insulating liquid sampling for dissolved gas Analysis. If a transformer is to be scrapped, it is suggested that the degree of polymerization (DP) and moisture content tests be performed on samples from the transformer in accordance with the recommendations found in IEEE Std C57.140.

Proposal:

Following return to service, it is suggested that the transformer be monitored by periodic electrical tests and tests that include insulating liquid sampling for quality and dissolved gas analysis. If a transformer….

ii. Motion to approve proposal as presented – S.Chambers, 2nd – W.Binder
1. 22-YES, 0-NO, 1-ABSTAIN: MOTION APPROVED

b. Section 5.3.6.3 Testing under vacuum.
i. The changes to this clause had already passed during the Spring 2023 meeting. Chair shared on screen for information purposes only. Approved revisions to be on the next released document. The new wording for this clause can be found below.

Current Document:

5.3.6.3 Testing under vacuum

~~Some users have a practice of performing dc winding resistance measurements under vacuum while performing dry outs to determine the insulation temperature. Caution shall be used when tests are performed on the transformer while the equipment is under vacuum. The dielectric strength of the system is significantly reduced under these conditions; only sufficiently low voltage should be used, and users should consult with the manufacturer to obtain recommended voltage level or actions.~~

Approved Revision to be on the next release:

5.3.6.3 Testing under vacuum

Testing under vacuum is not recommended because vacuum significantly reduces dielectric strength.

c. Review the changes proposed for Table-2
i. There was general agreement to add switches, breakers, fuses to table from S23 meeting.

ii. The following proposal was presented at this meeting to add 3 rows under External conditions within Table 2:

	Condition of all switches	
	Conditions, settings of all fault interrupting devices and their distances to the transformer	
	Verification of the fuse ratings and their conditions	

i. Motion to approve proposal as presented – W.Binder, 2nd – A.Sarkar
   1. 27-YES, 0-NO, 0-ABSTAIN: MOTION APPROVED

d. Review the changes that were approved for Table 4 – Electrical tests
   i. Add "Core Clamp to ground *Applicable for isolated core clamps only" to Table 4
   ii. This change was presented for information to the working group as it was approved at the S23 meeting.

Table 4—Electrical tests

		Probable areas of concern				
		Major insulation—electrical	Minor insulation—electrical	Mechanical damage (short-circuit forces, etc.)—mechanical	May indicate problem location	Indicates electrical path from core to ground
√	**Common field tests**					
	Insulation resistance					
	Winding to winding	X			X	
	Winding to ground	X			X	
	All windings to ground	X			X	
	Core to ground					X
	Core Clamp to ground *			X		

* Applicable for isolated core clamps only

e. Review the changes that were approved for Table 7-Field test interpretation
   i. Add "Core Clamp heating" to the table 7 under Suspected problem category with "Abnormal gas analysis" as First priority and "Abnormal oil quality and particle count" as Second priority as presented.
   ii. This change was presented for information to the working group as it was approved at the S23 meeting.

Table 7—Field test interpretation

Suspected problem category	Significant test data		
	First priority	Second priority	Third priority
Shorted winding turn (minor insulation)	Abnormal gas analysis[k] Increase in excitation[c] Out of tolerance ratio[bi]	Abnormal open circuit FRA[l]	Abnormal winding resistance[e]
Open winding circuit	Out of tolerance ratio[bj]	Higher resistance[e]	Abnormal FRA[l]
Moisture	High insulation power factor[d]	Insulating liquid tests low dielectric, high moisture[f]	Low insulation resistance[a]
Damage to major insulation	High insulation power factor[d]	Low insulation resistance[a]	Abnormal FRA[l]
Through-fault mechanical damage	Abnormal FRA[l]	Higher impedance[g]	Change in winding capacitance (PF/CAP test)[d]
Core heating	Abnormal gas analysis[k]	Low core ground resistance[h]	Increase in excitation[c]
NOTE—Refer to the standard/clause listed in the footnotes for help in interpreting the results of each test.			

Core Clamp heating **Abnormal gas analysis** **Abnormal oil quality and particle count**

f. Review the changes proposed for Table 8-Internal inspection-main tank
   i. Task force leader-T.Raymond, Task force member-S.Chambers
   ii. Proposal presented to add 3 rows to Table 8 under the 'Burns, discoloration, or deposits' section:

	Core Clamp to tank connections	
	Tap Changer contacts and connections	
	Core ground connections	

   iii. Motion to approve proposal as presented – A.Sarkar, 2nd – D.Murray
      1. 29-YES, 0-NO, 0-ABSTAIN: MOTION APPROVED

g. Review the changes proposed for Introduction section
   i. Chair presented proposal for introduction section changes.
   ii. W. Binder informed the WG that changes to the introduction section do not require a vote, it is up to the chair.
   iii. The chair received feedback and will finalize a proposal for S24 meeting

3. New Business
   a. Changes in the Definitions section. Proposals from B.Forsyth were presented during the meeting and discussed. 7 items for this section were presented with proposed changes shown in red and proposed deletions shown with a line through the text to be deleted.

Item 1: compressive force-*PROPOSAL TO BE EMAILED FOR VOTING BEFORE S24 MEETING*

Existing Definition: (A) The force that presses the inside coil toward the core. (B) The force attraction that presses coils wound in opposite directions together in a set of pancake coils.

Proposed Change: (A) The force that presses the inside coil toward the core. (B) The force ~~attraction~~ that presses coils wound in opposite directions together in a set of pancake coils. (C) The axial force applied to pre-compress core form windings to prevent uncontrolled axial movement in service.

Justification: a) The word "attraction" seems out of place or is possibly missing the word "of" in front of it. b) Item (C) provides a definition of an important compressive force that is not described elsewhere.

F23 WG discussion: Lots of discussions on this. Could not finalize, nor vote. Chair will work offline with Bruce and other WG members. Will email proposal and request vote.

Item 2: hoop compression / buckling-*PROPOSAL TO BE EMAILED FOR VOTING BEFORE S24 MEETING*

Existing Definition: There is no current definition.

Proposed Change: The radially inward force that acts on a coil.

Justification: Hoop compression (buckling) is a common failure mode and contrasts with hoop tension, which is already defined.

F23 WG discussion: Lots of discussions on this. Could not finalize, nor vote. Chair will work offline with Bruce and other WG members. Will email proposal and request vote.

Item 3: main tank - *APPROVED*

Existing Definition: The steel container for the main coil and insulating liquid (liquid or gas).

Proposed Change: The ~~steel~~ metallic container for the main core and coil assembly and insulating liquid (liquid or gas).

Justification: a) While rare, some tanks are aluminum.
b) The phrase “core and coil assembly” is a more thorough description of what goes in the tank.

F23 WG discussion: Motion to accept proposed change as presented-B.Forsyte, 2nd -M.Saad
22-YES, 0-NO, 0-ABSTAIN: MOTION APPROVED

Item 4: spiral winding (transformer winding)-*PROPOSAL TO BE EMAILED FOR VOTING BEFORE S24 MEETING*

Existing Definition: Many insulated conductors in parallel, often two strands wide and many (6 to 20) strands high, spirally wound on an insulating cylinder from one end to the other. Continuously transposed cable may also be used. The spiral winding resembles a spring coil. *Syn*: **helical winding**.

Proposed Change: Many insulated conductors in parallel, ~~often one or more two strands wide and many (6 to 20) strands high, spirally~~ wound on an insulating cylinder from one end to the other. Continuously transposed cable may also be used. The spiral winding resembles a spring coil. *Syn*: **helical winding**.

Justification: This guide should not imply absolute limits.
F23 WG discussion: Lots of discussions on this. Could not finalize, nor vote. Chair will work offline with Bruce and other WG members. Will email proposal and request vote.

Item 5: strap-wound coils (transformer winding) - *APPROVED*

Existing Definition: Single or multiple layer conductors, from 25 mm to 75 mm wide, spirally wound around an insulating form, with a layer of insulation between conductors. The conductors can be aluminum or copper. This type of winding can consist of two or

more groups electrically connected in parallel. Typically used in low-voltage windings.

Proposed Change: Single or multiple layer conductors, typically from 25 mm to 75 mm wide, spirally wound around an insulating form, with a layer of insulation between conductors. ~~The conductors can be aluminum or copper.~~ This type of winding can consist of two or more groups electrically connected in parallel. Typically used in low-voltage windings.

Justification: a) This guide should not imply absolute limits.
b) The conductor material is not necessary for the definition.

F23 WG discussion: Motion to accept proposed change as presented-S.Chambers, 2nd -M.Saad
18-YES, 0-NO, 0-ABSTAIN: MOTION APPROVED

Item 6: strip-wound coils (transformer winding) - *APPROVED*

Existing Definition: Single conductors, typically 75 mm to 250 mm wide, spirally wound around an insulating form, with a layer of insulation between conductors. The conductors can be aluminum or copper. This type of winding can consist of two or more groups electrically connected in parallel. Typically used in low-voltage windings.

Proposed Change: Single conductors, typically 75 mm to 250 mm wide, spirally wound around an insulating form, with a layer of insulation between conductors. ~~The conductors can be aluminum or copper.~~ This type of winding can consist of two or more groups electrically connected in parallel. Typically used in low-voltage windings.

Justification: The conductor material is not necessary for the definition.

F23 WG discussion: Motion to accept proposed change as presented-S.Chambers, 2nd -M.Saad
21-YES, 0-NO, 0-ABSTAIN: MOTION APPROVED

Item 7: user

Existing Definition: The owner of the transformer.
Proposed Change: The ~~owner~~ operator of the transformer.
Justification: Not every owner of a transformer is the user.

F23 WG discussion: Motion to accept proposed change as presented-S.Chambers, 2nd -M.Saad
19-YES, 0-NO, 0-ABSTAIN: MOTION APPROVED

   b. Information was sent before F23 meeting by S.Chambers for proposed changes to Figure 1 in Section 4.2 Investigation flow chart and Table 8 but were not able to be reviewed in this WG meeting due to lack of time. Changes to be reviewed by chair and either circulated via email before S24 WG meeting or presented at the S24 WG meeting as new business.

4. Membership changes
   a. Officers will look at attendance of members and member requests to make changes to WG membership list before the Spring 2024 meeting.
5. Next meeting: March 11, 2024 at the Spring 2024 Transformers Committee Meeting scheduled for March 10-14, 2023, Vancouver, BC, CANADA.
6. Close of meeting
   a. Meeting adjourned at 6:00pm

Submitted by: Hakan Sahin Date: 11/12/23

Oct 23, 2023 Meeting Attendance (RM = Request Membership):

Last Name	First Name	Company (Affiliation)	Role
Alahmed	Alex	Energy-Wolfcreek	Guest
Allison	Robert	Dominion Energy	Guest
Arevalo	Edmundo	Bonneville Power Administration	Guest
Avanoma	Dnome	MJC	Guest
Bargone	Gilles	FISO Technologies Inc.	Guest
Bedoya	Duvier	Hitachi Energy	Guest
Betancourt	Enrique	Prolec GE	Member
Bharduaj	Rahul	Burns & McDonnell	Guest
Bhatt	Vivele	Prolec GE	Guest-RM1
Binder	Wallace	WBBinder Consultant	Member
Boettger	William	Boettger Transformer Consulting LLC	Member
Bolar	Sanket	Oncor	Member
Bray	Elisabeth	Southern Company	Guest
Brodeur	Samuel	Hitachi Energy	Guest
Calitz	David	Siemens Energy	Guest
Carrizales	Juan Alfredo	Prolec GE	Guest
Chambers	Stuart	Stuart Drew Chambers Consulting	Member
Cheim	Luiz	Hitachi Energy	Guest
Cho	Enn Young	Hico-America	Guest
Colopy	Craig	Retired (General Interest)	Guest
Craven	Michael	Qualus Power Serv.	Guest
Crochett	Daniel	Ameren	Guest-RM2
Cross	James	Kinetrics	Guest
DaSilva	Roberto	Cargill, Inc.	Guest
De Oliveira	Everton	Siemens Energy	Member
Dennis	Scott	Hitachi Energy	Guest
Dillon	Nikolaus	Dominion Energy	Member
Dix	Larry	Quality Switch, Inc.	Member
Draper	Zachary	Delta-X Research	Guest-RM1
Dulac	Hakim	Advanced Power Technologies	Guest-RM1
Duncan	Kirk	Hitachi Energy	Guest
Dutta Roy	Samragni	Siemens Energy	Guest
Eshenroder	Jacob	Burns & McDonnell	Guest
Espindola	Marco	Hitachi Energy	Member
Faur	Florin	Prolec GE Waukesha	Member
Fitzgerald	Sean	ComEd	Guest
Flores	Hugo	Hitachi Energy	Guest-RM2
Forsyth	Bruce	Bruce Forsyth and Associates PLLC	Member
Garcia Wild	Eduardo	Siemens Energy	Member
Gonzalez Saiz	Luis	Evergy	Guest
Gragert	Jeffrey	Xcel Energy	Guest
Gupta	Ravi	Megger	Guest
Hanson	Corey	Flex-Core	Guest
Hernandez	Ronald	Doble Engineering Co.	Member
Hoffman	Saramma	PPL	Guest
Hollrah	Derek	Burns & McDonnell	Guest
Imece	Ali	PowerServ	Guest
Jacob	Nathan	Camlin Energy	Guest-RM2
Jarosz	Patrycia	IEEE	Guest
Johnson	Christopher	Oncor	Guest
Katz	Nathan	PacifiCorp	Guest
Kazmierczak	Jerzy	Hitachi Energy	Guest
Kessler	Stacey	Ulteig Engineers	Guest-RM2
Khan	Qasim	NEETRAC-GT	Guest
Kiparizoski	Zan	Howard Industries	Guest-RM2
Knapp	Evan	EATON Corporation	Guest
Koshel	Anton	Delta Star Inc	Guest
Kraetge	Alexander	OMICRON electronics Deutschland GmbH	Guest
Leal	Fernando	Prolec GE	Guest
Lee	Junho	Hyundai Electric	Guest
Li	Weijun	Braintree Electric Light Dept.	Member
Loiselle	Llc	Tetra Tech	Guest
Machain	Jose Luis	Prolec GE	Guest

Last Name	First Name	Company (Affiliation)	Role
Mani	Kumar	Duke Energy	Guest
Manzano	Moses	Hyosung HICO	Guest
Marathe	Swapnil	Megger	Guest
Martinez	Alberto	WEG	Guest
Melle	Tom	Highvolt	Member-ViceChair
Miller	Mike	Siemens Energy	Guest
Mills	Francis	Power Engineers	Guest
Montanha	Juliano	Siemens Energy	Guest-RM1
Munoz	Marta	Hitachi Energy	Guest
Murray	David	TVA	Member
Musgrove	Ryan	Oklahoma Gas & Electric	Member
Naderian	Ali	METSCO Energy Solutions Inc.	Guest-RM1
O'Malley	Anastasia	Consolidated Edison Co. of NY	Member
Patel	Sanjay	Smit Transformer	Member
Pellon	Verena	FPL	Guest
Pidcock	Jay	Ameren	Guest
Pruente	John	Prolec GE Waukesha	Member
Rathi	Rakesh	Virginia Transformer Corp.	Guest
Raymond	Timothy	EPRI	Guest-RM2
Reimer	Jonathan	Fortis BC	Guest
Reyes Perez	Juan	Hitachi Energy	Guest
Richardson	Michael	Ameren	Guest
Rock	Patrick	American Transmission Company	Guest
Saad	Mickel	Hitachi Energy	Member
Sahin	Hakan	Virginia Transformer Corp.	Member-Chair
Sarkar	Amitabh	Virginia Transformer Corp.	Member
Scardazzi	Alaor	Siemens Energy	Guest
Schindler	Stefan	Maschinenfabrik Reinhausen	Guest
Schleismann	Eric	Southern Compnay	Guest
Schrammel	Alfons	Siemens Energy	Guest
Schwartz	Dan	Quality Switch, Inc.	Member
Selvaraj	Pugal	Virginia Transformer Corp.	Member
Sethi	Kabir	Hitachi Energy	Guest
Sewell	Adam	Quality Switch, Inc.	Member-Secretary
Sewell	Russ	Quality Switch, Inc.	Guest
Shaikh	Abdul Majid	Delta Star Inc	Guest
Sharpless	Samuel	Rimkus Consulting Group	Guest-RM1
Sinclair	Jonathan	Black & Veatch	Guest
Singh	Kushal	ComEd	Guest
Snyder	Jason	First Energy	Guest
Sohn	Yong Tae	Hyosung HICO	Guest
Som	Sanjib	Pennsylvania Transformer	Guest-RM2
Speegle	Andy	Entergy	Guest
Szczechowski	Janusz	Maschinenfabrik Reinhausen	Member
Tanaka	Troy	Burns & McDonnell	Member
Thiede	Andreas	Highvolt	Guest
Thompson	Ryan	Burns & McDonnell	Guest
Tleoukoulov	Anar	Qualitrol	Guest
Trifunoski	Risto	Trench Limited	Guest
Uhlmann	Olivier	Reinhausen Canada	Guest
Van Dreel	Cole	American Transmission Co.	Guest
Vanderwalt	Alwyn	ECI	Guest
Verdolin	Rogerio	Verdolin Solutions Inc.	Member
Vijayan	Krishnamurthy	PTI Transformers	Guest
vonGemmingen	Richard	Dominion Energy	Member
Wallace	David	Mississippi State University	Guest
Washburn	Alan	Burns & McDonnell	Member
Weisensee	Matthew	PacifiCorp	Guest
Whitten	Christopher	Hitachi Energy	Guest
Woods	Deanna	American Transmission Co.	Member
Wright	Jeffrey	Duquesne Light Co.	Guest
Yun	Joshua	Virginia Transformer Corp.	Member
Zhao	Peter	Hydro One	Guest

Attachment K4.8

IEEE Transformers Committee
PC57.170 Condition Assessment Guide Working Group
Ballroom Century A, Westin Crown Center
October 24, 2023
Kansas City, MO

1. Call to Order

A. Chair's Remarks

B. IEEE-SA Policies

i. Call for Essential Patents

ii. Copyright

C. Establishment of quorum 40 members present (55 members (to be verified) in Working Group) - quorum established > 50%. A total of 105 guests and members were present at the meeting.

2. Agenda Review and Approval

Approval of Agenda
Moved: Gary Hoffman
Seconded: Scott Reed

3. Approval of Meeting Minutes

Motion to accept minutes of the spring meeting March 20, 2023 @ Milwaukee, WI
Moved: Tim Raymond
Seconded: Bill Whitehead

4. PAR Topics

A. Timeline review

Working Group Chair Kumar Mani showed a slide with where we are in the process relative to the PAR timeline.

- Completion of Straw Ballot to WG- Nov 30, 2023
- Comment Resolution Group work completion- Feb 28, 2024
- Vote to SA ballot- Spring 2024 WG meeting
- Publish Guide- Dec 2025

5. Technical Topics

a. Guide Draft Status

Draft was emailed to all members of the working group with a request for comments in Sept 2023.

b. WG Straw Ballot Results

Received 24 comments so far from the members, mostly editorial and some technical. These comments were not discussed during today's meeting. Deadline for receiving straw ballot comments was extended to Nov 30, 2023 (no motion required).

c. Setup Comment Resolution Group

Motion was moved to form Comment Resolution Group and allow the CRG to review and make changes to the guide draft:

Moved: Marcos Ferreira
Seconded: Tim Raymond
Carried unanimously.

The following WG Officers volunteered to be part of the Comment Resolution Group:

Alan Sbravati
Saramma Hoffman
Emilio Morales-Cruz
Tim Raymond
Alvin Vanderwalt
Marco Ferreira
Luis Cheim
Attila Gyore
Bill Whitehead
Mauricio Soto
Elizabeth Bray
Trent Williams
Hakim Dulac
Brad Staley
Janus Szczechowski
Kwasi Yeboah
James Cross
Kumar Mani

6. Action Items

a) Email draft to Paul Boman at HSB.

b) Email draft to Nathan Jakob at Camlin

c) Verify membership for the following and send confirmatory email: Evengi Ermakov, Joshua Yun, Hakim Dulac, Gary Hoffman, Amitabh Sarkar, Hemchandra Shertukde, Mauricio Soto, Tim Rocque, Enrique Betancourt, Dharam Vir and Peter Zhao.

7. Unfinished Business

None

8. New Business

None

9. Next Meeting

A. March 10, 2024 – Vancouver, BC Canada

10. Meeting was adjoined.

Motion to adjourn: Bill Whitehead, Seconded: Alan Sbravati

Carried unanimously.

Kumar Mani	**James Cross**	**Akash Joshi**
Chair	**Vice Chair**	**Secretary**

List of Attendees:

First Name	Last Name	Member Y/N	Affiliation
Mohammed	Al Yousuf		PSEG
Alex	Alahmed		
Robert	Allison		Dominion Energy
Jennie	Aloenlio		
Richard	Amos		Retired
Elise	Arnold		SGB – SMIT Group
Kush	Arora		
Javier	Arteaga		Hitachi Energy
Elizabeth	Bray		Southern Company
Samuel	Brodeur		Hitachi Energy
Erich	Buchgeher		Siemens Energy
Enrique	Betancourt	Y	GE Prolec
William	Boettger	Y	Boettger Transformer Consulting LLC
Jorge	Cantu		
Juan Alfredo	Carrizales		GE Prolec
James	Cross	Vice Chair	Kinectrics
John	Crouse		Roswell Alliance
Tim	Dappen		Cargill
Luiz	Cheim	Y	Hitachi Energy
Yamille	del Valle		Neetrac
Eric	Doak		D4 Energy Solutions
Hakim	Dulac	Y	APT Technologies
Paul	Dolloff		
Jeffrey	Door		H-J Family of Companies
Zack	Draper	Y	Delta X Research
Don	Dorris		Nespower
Wayne	Ellis		Memphis Light, Gas & Water
Evgenii	Ermakov	Y	Hitachi Energy
Joe	Faherty		
Zlatan	Fazlic		Camlin Power
Marco	Espindola	Y	Hitachi Energy
Marcos	Ferreira	Y	Quanta Technology
Atila	Gyore	Y	M&I Materials Ltd
Rich	Frye		
Jeffrey	Gragert		Xcel Energy

James	Graham		Retired
Ismail	Guner	Y	Hydro One
Shamaun	Hakim		WEG Transformers
Corey	Hanson		
Roger	Hayes		GE
Thang	Hochanh		IREQ
Gary	Hoffman	Y	APT Technologies
Saramma	Hoffman	Y	PPL
Jean	Hernandez		Neetrac
Traci	Hopkins		H2 Scan
Rezai	Hossein		
Natan	Jakob		
Christopher	Jhonson		Oncor
Thrinadla	Katapeli		VirginiaTransformer Corp
Axel	Kraemer		Reinhausen
Stacey	Kessler		TC Energy
Jacob	Kuruvilla		Exelon
Aleksandr	Levin		Weidmann
Weijun	Li	Y	Beld
Luc	Loiselle		Tetratech
Stephanie	Mabrey	Y	Weidmann
Jinesh	Malde		MI Materials
Kumar	Mani	Chair	Duke Energy
Emilio	Morales-Cruz	Y	Qualitrol Corp
Anatoliy	Mudryk		Camlin Power
Paul	Mushill	Y	Ameren
Volney	Naranyo		Megger
Arturo	Nunez		Mistras Group
Joe	Nims		Allen & Hoshall, Inc.
Tomas	Olsson		Hitachi Energy
Rakesh	Patel		Hitachi Energy
Poorvi	Patel	Y	EPRI
Monil	Patel		
Patrick	Picher		IREQ
Chris	Ratledge		Dynamic Ratings
John	Reagan		RWE Renewables
Tim	Raymond	Y	EPRI
Larry	Rebman		
Scott	Reed	Y	MVA Diagnostics
Perry	Reeder		GE Prolec

Jonathan	Reimer	Y	
Tim	Rocque	Y	GE Prolec
Mickel	Saad	Y	Hitachi Energy
Tommy	Salmon		GE
Oliverio	Sanchez		GE
Amitabh	Sarkar	Y	Virginia Transformer Corp
Alan	Sbravati	Y	Hitachi Energy
Hemchandra	Shertukde	Y	Univ. of Hartford
Jonathan	Sinclair	Y	Black & Veatch
Mauricio	Solo	Y	Hitachi Energy
Brad	Staley	Y	Leeward Energy
Dean	Summer		
Charles	Sweetser	Y	Omricon
Janusz	Szczechowski	Y	Reinhausen
Troy	Tanaka		Burns & McDonald
Miloje	Tanaskovic		Boiler Inspection & Insurance of Canada
Mark	Tostrud	Y	Dynamic Ratings
Rogerio	Verdolin	Y	Verdolin Solutions Inc.
Dharam	Vir	Y	GE Prolec
Pragnesh	Vyas	Y	Solomon Corp
Joshua	Yun	Y	Virginia Transformer Corp.
Matthew	Webb		GE
Drew	Welton		Intellirent
Peter	Werelius		Megger
Leon	White		H2 Scan
William	Whitehead	Y	H2 Scan
Trenton	Williams		APT Technologies
Deanna	Woods		Alliant Energy
Jeffrey	Wright	Y	Duqlight Power
Kwasi	Yeboah		GE
Samuel	Young		Hitachi Energy
Guang	Yuan		Hitachi Energy
Peter	Zhao	Y	Hydro One
Kris	Zibert		Allgeier, Martin and Associates

Guests Requesting Membership:

First Name	Last Name	Affiliation	Requested Membership

Eric	Doak	D4 Energy Solutions	Y
Jeffrey	Gragert	Xcel Energy	Y

Power Transformers Subcommittee
Working Group Report

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 expires 12/31/2027

PAR Expiration Date: **Std expires 12/31/2025**

Meeting Date: **24 October 2023** **Time:** **8:00am-9:15am**

Location: **Kansas City, MO, USA**

Attendance:	**Members**	**15 of 15**
	Guests	**12**
	Guests Requesting Membership	**1st meeting – all membership requests granted**
	Total*	**27**

*** 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 24, 2023 at Westin at Crown Center; Kansas City, MO, USA – Liberty (BR) room.
2. Presentation of Agenda
3. Presentation of IEEE Standards Slides
    a. Call for Patent Claims & Copyright Notice
    b. No comments from working group about any patent claims or copyright notice
4. Distribution of attendance sheets
    a. Please send an email to adamsewell@ieee.org with the subject: C57.157 EMAIL to be added to the C57.157 email list
5. Checking the Quorum – since this was the first working group all attendees who wanted to be members were granted membership.
    a. 15 out of 15 members were in attendance of the meeting so quorum was achieved.
6. Approval of the Meeting Minutes from Milwaukee Spring 2023 and Agenda for Fall 2023.
    a. Motion was made by Jeremy Sewell and seconded by Dan Schwartz to approve Spring 2023 and Agenda for Fall 2023.
    b. No opposition to unanimous approval of the motion - APPROVED
7. Chair announcements
    a. Current guide standard is set to expire December 31, 2025

b. 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. This group is now a working group.

8. Old work
    a. Request was made to share previous presentations that were used to develop this guide standard
        i. Chair posted previous presentations and 2015 C57.157 standard on IEEE Collabratec and IEEE TC Power Transformer Subcommittee pages
    b. Members of this group were tasked to review current guide standard and previous presentations before Fall 2023 meeting and make suggestions as to what recommendations they have for this guide standard.
9. New Work
    a. Determine sections to review and ask for volunteers to look at those in detail for creating a draft.
        i. The following members volunteered to review the current guide standard and propose changes to be reviewed at the next working group meeting:
            1. Larry Dix
            2. Dan Schwartz
            3. Florin Faur
    b. T. Tillery and P. Hopkinson brought up looking at synthetic esters for use in this guide standard.
        i. Chair will either give a presentation or have a presenter on the topic of synthetic esters for the next meeting in Vancouver.
10. Next meeting: March 12, 2024 at Spring 2024 Transformers Committee Meeting scheduled for March 10-14, Vancouver, BC, CANADA.
11. Close of meeting
    a. Meeting adjourned at 8:30am

Submitted by: Adam Sewell Date: October 25, 2023

Meeting Attendance 10/24/2023

Working Group Attendance - *(CIRCLE ROLE TO REQUEST MEMBERSHIP)*

IEEE C57.157-WG Functional Life Tests on Switch Contacts

October 24, 2023 8:00am-9:30am

Initials	Last Name	First Name	Company (Affiliation)	Role	email - fill in if says "0-NEED"
PB	Blaszczyk	Piotr	Specialty Transformer Components LLC	Secretary	
CoC	Colopy	Craig	Consultant	Guest	
JCV	Cruz Valdes	Juan Carlos	Prolec GE	Member	
LD	Dix	Larry	Quality Switch, Inc.	Member	
SDR	Dutta Roy	Samragni	Siemens Energy	Member	
FF	Faur	Florin	Prolec GE Waukesha	Member	
HAF	Flores	Hugo	Hitachi Energy	Member	
RF	Frotscher	Rainer	Maschinenfabrik Reinhausen	Guest	
JG	Gamboa	Jose	H-J Family of Companies	Guest	
AG	Gorzin	Alireza	Black & Vratch	Guest	
PH	Hopkinson	Phil	Hvolt Inc	Guest	
AM	**Martinez**	**Alberto**	**WEG USA**	**Guest**	
HM	Murillo	Hugo	H-J Family of Companies	Member	
RM	**Musgrove**	**Ryan**	**Oklahoma Gas + Electric**	**Guest**	
VN	**Naranjo**	**Volney**	**MEGGER**	**Guest**	
MN	Newbill	Markus	Hitachi Energy	Member	
BP	**Pousset**	**Bautista**	**Transformer Protector**	**Guest**	
SR	Rehkopf	Sebastian	Maschinenfabrik Reinhausen	Member	
JR	**Reimer**	**Jonathan**	**Foryis BC**	**Guest**	
LS	Saudsten	Lina	Hitachi Energy	Member	
DS	Schwartz	Dan	Quality Switch, Inc.	Member	
AS	Sewell	Adam	Quality Switch, Inc.	Chair	
JS	Sewell	Jeremy	Quality Switch, Inc.	Member	
RS	Sewell	Russ	Quality Switch, Inc.	Guest	
JS	**Smith**	**Jimmy**	**Howard Ind**	**Guest**	
JT	Tillery	Timothy	Howard Industries	Member	
CLW	Whitten	Christopher	Hitachi Energy	Member	

Attachment K4.11

Working Group Meeting for IEEE Standard PC57.17

Kansas City, Missouri Meeting – October 24, 2023 11:00-12:15 pm CDT
Chair: Dom Corsi
Secretary: Jason Varnell

1. The meeting was called to order at 11:00 AM CDT.
2. Jason Varnell from Doble Engineering presided as chair for the working group meeting due to the absence of the working group chair.
3. There were 34 active participants present. 19 participants requested membership, which was granted since this meeting was the first working group meeting. There are now 20 members including the WG chair who was absent.
4. The acting chair reviewed the IEEE patent slides and the group made no patent claims.
5. The acting chair reviewed the copyright policy with the group.
6. The chair will request from IEEE SA that the latest draft to be provided in the latest IEEE format and template. Then the chair will upload the current working draft to the IEEE Transformers Committee website and then notify the working group once it is posted to the website.
7. The acting chair requested volunteers to help updating the standard on a clause-by-clause basis. The following participants are responsible for reviewing the sections prior to the next working group meeting and prepare to discuss recommended changes or edits.
    a. Ratings section – Dan Sauer from Eaton Corporation and Jason Beaudoin from Weidmann volunteered for this section.
    b. Connections section – Sanjib Som from Pennsylvania Transformer, Emilio Morales from Qualitrol and Thrinadha Katapalli from Virginia Transformers volunteered for this section.
    c. Testing section – Dom Corsi from Doble and Jason Varnell from Doble volunteered for this section.
    d. Construction section – Sanjib Som from Pennsylvania Transformer volunteered for this section.
    e. Annex A – DC Arc Furnace section – Dan Sauer from Eaton Corporation and Jerzy Kazmierczak from Hitachi Energy volunteered for this section. The chair will continue to reach out to Tamini for volunteers.
    f. Annex B – IEEE Guide for Arc-Furnace Protection section – No volunteers came forward.
    g. Annex C – Replacement and Remanufacturing of Low Voltage Bus Bars – Jason Beaudoin from Weidmann and Jason Varnell from Doble Engineering volunteered for this section.
    h. Annex D – Bid Document Checklist section - No volunteers came forward.
    i. New Section on High Temperature Insulation Application (including Fiber Optics) Section – Gilles Bargone from FISO and Emilio Morales from Qualitrol volunteered. No additional volunteers from transformer manufacturers came forward.
8. Jerzy Kazmierczak from Hitachi Energy summarized his review of the Definitions section, which included the working group's consensus to remove the definition of dissolved gas analysis and power factor from the document; however, the definition for ONWN would remain. Reference to the IEEE dictionary and C57.12.80 will need to be incorporated into the working draft.
9. Emilio Morales from Qualitrol summarized his work on the new section on High Temperature Insulation Application (including Fiber Optics). It was requested that the text clarify the differences between core form and shell form, especially as it relates to hotspots. The subgroup will schedule a virtual meeting with the working group chair to discuss how to implement the new section into the draft. Additional discussions were on reference to the "life of the transformer" versus specifically referring to the "insulation life" for cellulose and high temperature insulation. The working group agreed that the new section should start as an annex and be added as an annex prior to uploading the new draft to the IEEE Transformers Committee website.
10. The next working group meeting will be in Vancouver, BC Canada during the Spring 2024 Transformers Committee Meeting.
11. The meeting adjourned at 11:51 CDT.

Attendance Record:

Status as of 10/24/2023	Last Name	First Name	Affiliation
Guest	ABDALLA	ISAAC	HICO AMERICA
Member	ALAHMED	ALEX	EVERGY
Guest	ALDENLIO	JENNIE	HITACHI ENERGY
Member	BARGONE	GILLES	FISO
Guest	BARKER	SEAN	HITACHI ENERGY
Member	BEAUDOIN	JASON	WEIDMANN
Member	BOETTGER	WILLIAM	BOETTGER TRANSFOMER CONSULTING LLC
Member	CARRIZALES	JUAN ALFREDO	PROLEC-GE
Guest	CHAN	VIVIAN	HITACHI ENERGY
Guest	CZERNORUCKI	MARCOS	HITACHI ENERGY
Guest	DAPPEN	TIM	CARGILL
Guest	DOMINGUEZ	RAUL	WEG TRANSFORMERS
Member	GUSTAUSSON	NIKLAS	HITACHI ENERGY
Guest	HEINZIG	PETER	WEIDMANN
Guest	JAROSZ	PATRYCJA	IEEE SA
Guest	JUCHEM	KEVIN	HITACHI ENERGY
Member	KATAPALLI	THRINADHA	VIRIGINA TRANSFORMER
Member	KAZMIERCZAK	JERZY	HITACHI ENERGY
Member	KENNEDY	SHELDON	SHELDON KENNEDY ENGINEERING PLLC
Guest	KOSHEL	ANTON	DELTA STAR INC
Member	MORALES-CRUZ	EMILIO	QUALITROL
Member	MUSGROVE	RYAN	OG&E
Member	NEWBILL	MARK	HITACHI ENERGY
Guest	PARK	HOONY	ILJIN ELECTRIC
Guest	POLLARO	DOMINIC	NASS
Member	SANDSTEN	LINA	HITACHI ENERGY
Member	SAUER	DAN	EATON
Guest	SOHN	YONG TAZ	HYOSUNG HICO
Member	SOM	SANJIB	PTTI
Secretary	VARNELL	JASON	Doble Engineering Co.
Member	WEYER	DANIEL	MONOLITH CORP
Member	WILLIAMS	TRENTON	ADVANCED POWER TECHNOLOGY
Member	WHITTEN	CHRISTOPHER	HITACHI ENERGY
Guest	YOUNG	TIM	HITACHI ENERGY

Attachment K4.12

WG – C57.107
IEEE / PES Transformers Committee

Recommended Practice for Developing Short-Term Overexcitation V/Hz Curves for Transformers Directly Connected to Generators

Tuesday, October 24, 2023, 1:45PM – 3:00PM, CDT
Westin Hotel, Liberty Ballroom
Kansas City, MO

Joe Watson – Chair Ramsis Girgis – Vice Chair Drew Welton – Secretary

The meeting started at 1:45PM.

There were 17 of 24 members and 33 guests present, allowing for a Quorum.

The group unanimously approved the proposed agenda of this meeting and minutes of the Spring 2023 meeting that had been sent out to members and guests with the meeting notice.

The Patent and Copyright issues were discussed, and no concerns were raised.

Chair's Remarks

The chair announced the results of the balloting of Draft 3, which was sent out in August and received 90% approval with 63 initial comments, and a few additional comments were added after the balloting had closed.

An 8-member Comment Resolution Group (CRG), chaired by Mr. Ryan Hogg, was formed from those who volunteered at the Spring 2023 Meeting and met twice to review and resolve all comments. All individuals who commented were advised of the resolution outcome, and Draft 4 with the agreed upon changes, was distributed prior to this meeting.

Areas of Discussion

There were 3 main areas of discussion.

Ryan Hogg presented a review of the 3 main technical comments addressed by the resolution group, with some further clarity on the resolution outcome.

There was some discussion surrounding the need for magnetic modeling of every different design. As stated in the Guide, the magnetic modeling is needed to determine what structural part would be thermally most affected by core saturation corresponding to higher values of V/Hz. The main parameter to determine the hot spot temperature in a technology is the rated core flux density of the different transformers. Manufacturers would use the results of the magnetic field modeling to determine method of developing the V/Hz curve for a transformer design. A reminder to the group is that this document is serving as a recommended practice for transformer manufacturers for developing the V/Hz curves.

Ryan Hogg made a motion to give this CRG the authority to send the ballot for recirculation as well as to resolve all future ballot comments and send those for recirculation if necessary. The motion was

seconded by Ion Radu and approved un-opposed.

New Business

Draft 4 will be sent for re-circulation in the next week or two.

This should be the last meeting for this working group, and we thank all those who participated and contributed.

Meeting Adjournment

The meeting adjourned at 3:00 PM.

Next Meeting

The WG expects to complete the ballot process before the next meeting. As long as there are no unforeseen delays, the WG should not need to meet again.

Meeting attendees and their affiliations

Name	Affiliation	Status
Adams, Kayland	Prolec/GE	Member
Alahmed, Alex	Evergy	Guest
Alonso, Carlos H.	Arteche	Guest
Arritt, Bob	EPRI	Guest
Baldua, Juan Alfredo Carrizales	Prolec/GE	Guest
Bernesjo, Mats	Hitachi Powergrids	Member
Boettger, William	Boettger Transformer Consulting	Guest
Bratu, Lorin	Trench	Guest
Colopy, Craig	Retired	Guest
Cruz Valdes, Juan Carlos	Prolec/GE	Member
Dinh, Huan	Hitachi Energy	Member
Garcia, Eduardo	Siemens Energy	Member
Ghosh, Rob	Power System Asset Management Solutions	Guest
Girgis, Ramsis	Hitachi Energy	Co-chair
Gorzin, Ahreza	Black and Veach	Guest
Hernandez, Giovanni	Virginia Transformer	Member
Hogg, Ryan	Bureau of Reclamation	Member
Jensen, Nicholas	Delta-Star	Member
Joshi, Akash	Mott MacDonald	Guest
Kapka, Sergion	Hitachi Energy	Guest
Kerschenbauer, Christoph	Siemens Energy	Guest
Kessler, Stacey	Ulteig Engineers	Guest
Knapp, Evan	Eaton Corp.	Guest
Koshel, Anton	Delta-Star	Guest

Krvavac, Jusuf	Sargent and Lundy	Guest
Li, Weijun	Braintree Electric Light Department	Guest
Mani, Kumar	Duke Energy	Guest
Montanha, Juliano	Siemens Energy	Guest
Morales-Cruz, Emilio	Qualitrol	Member
Murray, David	Tennessee Valley Authority	Member
Newbill, Mark	Hitachi Energy	Guest
Patel, Sanjay Y.	Royal Smit Transformers	Member
Radu, Ion	Hitachi Energy	Member
Rocque, Tim	Prolec GE	Guest
Sankarakurup, Dinesh	Duke Energy	Guest
Sarkar, Amitabh	VA Transformer	Member
Schrammel, Alfons	Siemens	Guest
Schweiger, Ewald	Siemens Energy	Guest
Speegle, Andy	Entergy	Guest
teNyenhuis, Ed	Hitachi Powergrids	Member
Thomas, Scott	Hitachi	Guest
Van Dreel, Cole	American Transmission	Guest
Veens, Jos	SGB-Smit	Guest
Watson, Joe	JD Watson and Associates	Chair
Webb, Bruce	Knoxville Utilities Board	Member
Webb, Matthew	GE	Guest
Welton, Drew	Intellirent	Secretary
White, Joe	Power Engineers	Guest
Yang, Fei	Hitachi Energy	Guest
Zamora, Omar Mendel	Prolec	Guest

Attachment K4.13

Task Force for Installation of Power Transformers C57.93
Tuesday, October 24, 2023
3:15 – 4:30 PM
Westin at Crown City, Century A (BR)
Kansas City, MO

Chairman: Scott Reed
Vice Chairman: Alwyn VanderWalt
Secretary: Kyle Stechschulte

First name	Last name	Status	First name	Last name	Status
Isaac	Abdella	Guest	Lic	Lioselle	Guest
Jennie	Aldenlid	Guest	Mario	Locarno	Member
Robert	Allison	Guest	Darrell	Mangubat	Guest
Greg	Anderson	Member	Kumar	Mani	Guest
Elise	Arnold	Guest	Toni	Mellin	Guest
Kush	Arora	Guest	Mike	Miller	Guest
Jeff	Bench	Guest	David	Murray	Member
Vivek	Bhatt	Member	Ryan	Musgrove	Member
Wallace	Binder	Guest	Paul	Mushill	Guest
Sanket	Bolar	Guest	Mark	Newbill	Guest
Robert	Bracum	Guest	Bradley	Staley	Guest
Elizabeth	Bray	Guest	Hoony	Park	Guest
Mike	Brown	Guest	Daniel	Posadas	Guest
Alonso	Casttillo	Guest	Charles	Sweetser	Guest
Marcelo	Catugas	Guest	John	Pruente	Guest
Stuart	Chambers	Guest	Ulf	Radbrundt	Guest
James	Cross	Guest	Scott	Reed	Chair
Juan Carlos	Cruz Valdes Delgado	Guest	Perry	Reeder	Member
Gabriel	Zamora	Guest	Jonathan	Reimer	Guest
Raul	Dominguez	Guest	Michael	Richardson	Guest
Kirk	Duncan	Guest	Diego	Robalino	Guest
Will	Elliott	Guest	Patrick	Rock	Member
Evgenii	Ermakov	Member	Mickel	Saad	Member
Joe	Faherty	Guest	Lina	Sandsten	Guest
Ken	Fedor	Guest	Alberto	Saydoval	Guest
Marcos	Ferreira	Guest	Alaor	Scardazzi	Member
Rainer	Frotscher	Guest	Ewald	Schweiger	Member
Lorne	Gara	Member	John	Sinclair	Guest

James	Gardner	Guest	Jason	Snyder	Guest
Rafael	Grajeda	Guest	Tommy	Spitzer	Guest
Ismail	Guner	Member	Mathew	Sze	Guest
Niklas	Gustavsson	Member	Troy	Tanaka	Guest
Guy	Halbrooks	Guest	Olivier	Uhlmann	Guest
Edward	Haung	Guest	Alwyn	VanderWalt	Vice Chair
Roger	Hayes	Member	Robert	Vary	Guest
Anthony	Natale	Guest	Matthew	Webb	Guest
Traci	Hopkins	Guest	Daniel	Weyer	Guest
Ali	Imece	Guest	William	Whitehead	Guest
Nathan	Jacob	Guest	Christopher	Whitten	Guest
Jeremy	Johnson	Guest	Deanna	Woods	Guest
Sheldon	Kennedy	Guest	Samuel	Young	Guest
Stacey	Kessler	Guest	Malia	Zaman	Guest
Weijun	Li	Member	Kris	Zibert	Guest
Jacky	Lin	Guest	Waldamar	Ziomel	Guest

The meeting was called to order at 3:16 pm by Chair Scott Reed. This is the fourth meeting for this Task Force. The PAR for this Task Force expires 12/31/29.

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

There were eighteen of twenty-eight members, so a quorum was achieved and a total of sixty-seven guests. Two guests who met the attendance requirements requested and were granted membership after the TF meeting. Likewise, three members have failed to meet the attendance requirements and were moved to guest status after the TF meeting.

A motion was made by Marcos Ferreira to accept the agenda and seconded by Ryan Musgrove. The agenda was approved with unanimous consent. Next, a motion was made by Weijun Li and seconded by Marcos Ferreira. The minutes were approved with unanimous consent.

The chair shared the existing title and scope with the Task Force. Next, he reviewed the Transformer and LTC Maintenance presentations from the past two meetings, discussed the scopes of C57.140, C57.152 and C57.170, and presented previous feedback regarding requested changes to the document, like dividing new installations between shipping full and empty, before opening the question to the floor whether to include maintenance as part of the revised guide. The members and guests discussed three options regarding maintenance: remove maintenance from the guide, update the guide to include a major maintenance section, or do an update and expand the light maintenance in the guide. The Task Force was concerned about removing maintenance completely from the guide as there are no other resources available and it will take years to develop. Likewise, the sentiment was it would be a very long and time-consuming task to add a comprehensive maintenance section.

As a result, a motion was made by Ryan Musgrove to issue a straw ballot to get input from the group to review the maintenance section of the guide to determine how to expand it. This will impact how the

scope will be written. Additional discussion occurred before Pat Rock seconded the motion. The motion passed unanimously.

The meeting was adjourned at 4:20 p.m.

Attachment K4.15

Unapproved Meeting Minutes

PC57.153 TF Guide for Paralleling Regulating Transformers

Minutes from Fall 2023, Kansas City 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 24,2023

2. Chairs Remarks

2.1 Essential Patent Claims

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

2.2 Copyright Policy

The Chair showed and briefly reviewed the IEEE slides related to Copyright Policy. There were no comments.

2.3 Participant Behavior

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

3. Attendance

- There were 43 attendees in the meeting
    - 7 members
    - 36 guest
    - 4 guests requested membership

- Quorum check
    - Quorum was achieved (7 of 9 members were present)

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

4.1. Proposed Meeting Agenda

- Welcome and call to order
- Distribution of sign-up rosters
- Call for Essential Patents
- Review of IEEE-SA Copyright policy
- Review of Code of Conduct Policy
- Review and approval of the meeting agenda
- Review and approval of the minutes from the spring meeting
- Status of PAR approval
- Call for volunteers to draft additional content
- New Business - None
    - Next Meeting(s)
        - March 12, 2024 – Vancouver BC
- Adjourn

The motion to approve the meeting agenda was passed.

- Motion by Dan Sauer
- Seconded by Markus Stank
- Unanimous approval

4.2 Approval of the minutes from the last meeting

The motion to approve the minutes from the last meeting was passed.

- Motion by Markus Stank
- Seconded by Ryan Musgrove
- Unanimous approval

5. Old Business

The Chair reviewed NesCom's comments on the PAR. NesCom found no issues with the title or the purpose of the guide, but concerns were raised regarding the scope. Based on the discussion during the last meeting, a motion was made to submit the PAR request with the existing title, scope, and purpose.

NesCom provided two comments:

1. Suggest removing the word "paralleling", from the first sentence of the scope.
2. The use of the word "master", in the "master/follower" control method may be considered to be offensive by some so NesCom recommended an alternative title for the method. They noted that a draft standard is under development within IEEE to promote non-offensive terminology.

A discussion was initiated concerning the second comment:

Dan Sauer expressed concerns that changing the established industry terminology might have a negative impact on the industry.

Mark Tostrud raised concerns about changing the word "master" to NesCom's proposed term "leader", could also be misleading in some circumstances.

Gary Hoffman, provided more information about the IEEE standard that's in development regarding the use of inclusive language in IEEE documents. He clarified that this standard has not been approved yet and is not applicable to our PAR. He suggested the group consider alternative language.

Several ideas for alternative terminology for the "master/follower" term were discussed including:

- Leader/Follower (as suggested by NesCom)
- Client/Server
- Main/Secondary
- Main/Follower
- Controller/Follower
- Master control/Follower control

- A motion was made to propose to NesCom to keep the terminology "master/follower" be retained. if NesCom doesn't agree, the motion proposes changing the terms to "master control/follower control" and eliminating the word "paralleling" form the first sentence of the scope
    - Motion by Markus Stank
    - Seconded by Dan Sauer
    - Unanimous approval

After further discussion a second motion was proposed:

- A motion was made to completely eliminate the names of each parallel control method, including the method “master/follower”, and to present the new scope to NesCom.
    - Motion by Markus Stank
    - Seconded by Dan Sauer
    - Unanimous approval

The chair called for volunteers to:

- Address comments received from the straw ballot performed in Spring 2023
- Review the concept of apparent circulating currents.
- Review the annex C of the document. Following attendees volunteered:
    - Dan Sauer
    - Viereck Karsten

- Address reverse power flow. Following attendees volunteered:
    - Markus Stank
    - Viereck Karsten

- Review and update the references. Following attendees volunteered:
    - Francis Mills

6. New Business

No new business

7. Next Meeting

March 2024 – Vancouver, BC

8. The meeting adjourned at 5:25 PM

9. Minutes

The minutes were recorded by Zan Kiparizoski – Secretary and reviewed by Mark Tostrud – Chair

TF C57.153 – Participation List, Kansas City, Fall 2023			
Secretary	Zan	Kiparizoski	Howard Industries
Member	Ryan	Musgrove	Oklahoma Gas&Electric
Member	Patrick	Rock	American Transmission Company
Member	Dan	Sauer	Eaton
Vice Chair	Cihangir	Sen	Duke Energy

Member	Markus	Stank	Reinhausen
Chair	Mark	Tostrud	Dynamic Ratings
Guest	Isaac	Abdalla	HICO America
Guest	Hugo	Avila	Hitachi Energy
Guest	Giles	Bargone	FISO
Guest	Edwin	Betancourt	Siemens Energy
Guest	Daniel	Blaydon	Baltimor Electric
Guest	Juan Alfredo	Carrizales	Prolec GE
Guest	Gabriel	Delgado	Invenergy
Guest	Lorne	Gara	Shermco Ind.
Guest	Corey	Hanson	Flex-core
Guest	Saramma	Hoffman	PPL
Guest	Gary	Hoffman	IEEE SA
Guest	Patrycja	Jarosz	IEEE SA
Guest	Viereck	Karsten	Reinhausen
Guest	Thrinadha	Katapalli	Virginia Transformers
Guest	Stacey	Kessler	Ulteig-Engineers
Guest	Evan	Knapp	Eaton
Guest	Rafal	Kovalski	Hitachi Energy
Guest	Juncho	Lee	Hyndai Electric
Guest	Weijun	Li	Braintree Electric Light Dept.
Guest	Luis	Machain	Prolec GE
Guest	Juliano	Mantanha	Siemens Energy
Guest	Francis	Millls	Power Engineers
Guest	Hugo	Murillo	The H-J family of companies
Guest	Ismael	Nojo	Eaton
Guest	Hoony	Park	Iljin Electric
Guest	Dwight	Parkinson	Eaton
Guest	Baptiste	Pousset	Transformer Protector co.
Guest	Yuri	Rossini	Siemens Energy
Guest	Stefan	Schindler	Reinhausen
Guest	Eric	Schleismann	Southern Company
Guest	Ewald	Schweigeer	Siemens Energy
Guest	Robert	Vary	Reinhausen
Guest	Dharam	Vir	Prolec GE
Guest	Matt	Weisensee	Pacificorp
Guest	Tim	Young	Hitachi Energy
Guest	Damil		Hitachi Energy