Annex K Power Transformers Subcommittee

March 13, 2024
Vancouver, BC, Canada
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, March 13 at 1:30 p.m. The attendance record indicates that 87 out of 108 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 225 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.

Four individuals requested membership by speaking with or emailing PTSC officers after the meeting. Three attended at least 3 out of the last 5 meetings and therefore qualified for "Member" status. The 4th has not been recorded in attendance in 3 out of the last 5 meetings, and therefore not yet qualified for membership.

Ten individuals updated their contact information. One individual has been moved from "Member" to "Guest" for not having recorded attendance at the last 3 out of 5 meetings.

With the membership changes stated above, PTSC has a total of 110 members after the Spring 2024 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 presented and the Fall 2023 meeting minutes as circulated. Ewald Schweiger (Siemens Energy) made a motion to approve the agenda and meeting minutes, which was seconded by Marcos Ferreira (Quanta Technology). The agenda and Fall 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. Seven members had been moved to Guest status due to not having attended at least 3 out of the last 5 meetings. Attendees were reminded to verify their email address and update as necessary. The Chair also announced that guests who wish to become a member of the Power Transformers Subcommittee should see subcommittee officers after the meeting or contact one of the officers by email requesting membership. Membership requests on paper roster will not be accepted.

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

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

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

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

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

The Chair introduced 8 new members that were added to the PTSC membership list since the Fall 2023 meeting. The new members are listed below:

Michael Botti (Hyosung HICO)
Jeremiah Bradshaw (Bureau of Reclamation)
Rob Ghosh (General Electric)
Francis Mills (Power Engineers, Inc.)
Abdul Majid Shaikh (Delta Star Inc.)
Craig Swinderman (Mitsubishi Electric Power Products)
Ryan Thompson (Burns & McDonnell)
Trenton Williams (Advanced Power Technologies)

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 group didn't meet in Vancouver. WG Chair Craig Colopy (Retired) reported that the final draft (D1.3) was approved as a revised standard by IEEE SA on February 15, 2024. The WG Chair thanked everyone involved for their contributions.

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. A quorum was not achieved. WG Chair Peter Zhao (BC Hydro) reported that a standard template was created for proper documentation of comments and proposals. The group reviewed the 7 comments received thus far and discussed further actions and assignments. Two years or 4 meetings are planned for collection of changes and proposals with a tentative plan of completing a draft document by the end of 2026. Kakim Dulac (Advanced Power Technologies) is now the WG's secretary.

The complete meeting minutes can be found in Attachment K.4.2. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

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

This working group met on Monday with 6 members and 24 guests present. 3 guests requested membership. WG Chair Craig Swinderman (Mitsubishi Electric Power Products) said that the PAR was approved on December 31, 2023 with an expiration date of December 31, 2027. The group reviewed Draft 1 of the document. The WG Chair indicated that further updating of IEEE 638 will be based on changes to another standard IEEE/IEC 60980-344 (2020).

The complete meeting minutes can be found in Attachment K.4.4. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

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

This group met on Monday with 50 attendees and achieved a quorum. WG Chair Ewald Schweiger (Siemens Energy) provided an update on document review since the Kansas City meeting. Presentations were given on the review of multiple clauses. This working group is looking for volunteers/specialists in protection & control to review the existing document for improvements and help with editorial changes. Sanjib Som (Pennsylvania Transformer) volunteered to coordinate assistance. Drew Welton (Intellirent) also offered to help.

Different task forces will be established to work on individual clauses and incorporate various findings/comments.

The complete meeting minutes can be found in Attachment K.4.5. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

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

This group didn't meet in Vancouver due to the new draft guide being in the final ballot resolution stage. WG Chair Mike Spurlock (Spurlock Engineering Services, LLC) was not in attendance. PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) reported that the WG has one comment left to resolve (out of the original 676 comments). The plan is to submit the final draft to the WG for approval to go to recirculation ballot once this final comment is resolved. The target completion date is the end of March 2024. The PTSC Chair thanked the WG Chair and members for their efforts throughout the revision process.

K.4.7 TF C57.12.10, Standard Requirements for Liquid-Immersed Power Transformers – Scott Digby

This task force met on Monday with 64 attendees. 22 individuals requested membership. The current document expires at the end of 2027. The task force voted unanimously to seek PTSC's approval to create a PAR to revise the document.

Scott Digby (Duke Energy) made a motion to create a PAR to revise C57.12.10, Standard Requirements for Liquid-Immersed Power Transformers. Sanjib Som (Pennsylvania Transformer) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.7. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

K.4.8 TF C57.140, Guide for Evaluation and Reconditioning of Liquid-Immersed Power Transformers – Sanjib Som

This task force had their first in-person meeting on Monday. The task force had an earlier virtual meeting on February 26, 2024. The main purpose of the TF is to create the title, scope, and purpose (if necessary) for submitting a PAR to revise C57.140. Both meetings provided lots of input. Monday's in-person meeting showed support for keeping the title unchanged. The TF plans to finalize the title, scope and purpose and seek PTSC's approval at the Fall 2024 meeting to create a PAR to revise the document.

The complete meeting minutes can be found in Attachment K.4.8. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

K.4.9 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.

A motion to use the definition of compressive force from C57.164 was approved with no objections and one abstention. Other old business items regarding the investigation flow chart were reviewed with an expectation of completing after the Vancouver meeting. Once ready, the revisions associated with these old business items will be sent to WG members via email for approval. The approved revisions, along with all other previously approved changes, will be incorporated into a draft document. The tentative goal is to complete a draft document and move to ballot during the Fall 2024 meeting.

The complete meeting minutes can be found in Attachment K.4.9. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

K.4.10 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 with a total of 41 attendees. A quorum was achieved. The PAR was approved June 2023 and expires December 2027. WG Chair Adam Sewell (Quality Switch, Inc.)

presented background information of why this guide was originally started. Florin Faur (Prolec GE) presented his comments on the current guide and his comments will be included in the meeting minutes for all to review. Discussion of synthetic esters was brought up as the current document does not have information about this type of ester. The WG Chair will either give a presentation or recruit a presenter for the next meeting on the topic of synthetic esters.

The complete meeting minutes can be found in Attachment K.4.10. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

K.4.11 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. Saramma Hoffman (PPL Electric Utilities) provided an update on straw ballot comment resolution. Stephanie Mabrey (Weidmann Electrical Technology) said that the current draft is ready to go for IEEE MEC review followed by SA Ballot. Brian Sparling (Kinectrics) gave a presentation on how to develop transformer assessment indices.

The working group voted unanimously to seek approval from PTSC to move the document to IEEE SA for MEC review and balloting. A comment resolution group has also been formed to resolve comments from the SA ballot.

Kumar Mani (Duke Energy) made a motion to move draft guide C57.170, Guide for the Condition Assessment of Liquid Immersed Transformers, Reactors and Their Components to ballot. Peter Zhao (BC Hydro) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.11. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

K.4.12 Revision of C57.150, Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or Higher – Greg Anderson

Due to the absence of WG Chair Greg Anderson (GW Anderson & Associates, Inc.), WG Vice Chair Ewald Schweiger (Siemens Energy) provided the PTSC membership with a quick update.

The revised guide was approved in 2023. The publication process within IEEE is slightly delayed due to reasons outside the WG's responsibility. The new target publication date is the end of March 2024.

K.4.13 WG PC57.17, Standard Requirements for Arc Furnace Transformers – Dom Corsi

This group met on Tuesday with a total of 25 attendees. 13 of 20 members were present; therefore, a quorum was achieved. This was the second meeting as a working group. With one newly added member, the WG now has 21 members. WG Secretary Jason Varnell (Doble Engineering Co.) led the meeting as WG Chair Dom Corsi (Doble Engineering Co.) was not in attendance due to a conflict.

The group reviewed the PAR details and confirmed study group volunteers for each subclause. A motion passed to make temperature rise test a routine test within this standard and incorporate into Draft D1.1. Another motion passed to straw ballot the WG with Draft D1.1 prior to the Fall 2024 meeting.

The complete meeting minutes can be found in Attachment K.4.13. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

K.4.14 WG C57.107, Recommended Practice for Developing Short-Term Overexcitation V/Hz Curves for Transformers Directly Connected to Generators – Joe Watson

This working group didn't meet in Vancouver. WG Chair Joe Watson (JD Watson and Associates Inc.) reported that the document was balloted with two re-circulations and Draft 5 was approved on February 4, 2024. The draft document has been submitted to RevCom for consideration at their next meeting. The WG Chair gave Thanks to all who participated in the development of this Recommended Practice and to all who participated in the balloting process.

This working group has completed its work; therefore, they won't meet again until the next revision cycle, probably in 4-5 years.

K.4.15 TF Liquid-Immersed Phase-Shifting Transformers 60076-57-1202 – Ewald Schweiger

This task force met on Tuesday. This was the first in-person meeting after having a virtual meeting on January 23, 2024. The current document expires at the end of 2027. The task force voted unanimously to seek PTSC's approval to create a PAR to revise the document.

Elwald Schweiger (Siemens Energy) made a motion to create a PAR to revise Part 57-1202: Liquid immersed phase-shifting transformers. Joe Watson (JD Watson and Associates Inc.) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.15. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

K.4.16 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.

A motion passed to change the Title to read, "IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers and Reactors".

A motion passed to change the Scope to read, "The recommendations presented in this guide apply to the installation and maintenance of liquid-immersed power transformers and reactors."

A motion passed after the conclusion of the meeting, via email, by the Task Force to go before the Power Transformers Subcommittee to request a PAR to revise the document with the Title and Scope that was voted on during the meeting.

Scott Reed (MVA) made a motion to create a PAR to revise C57.93 with the Title and Scope stated above. Ewald Schweiger (Siemens Energy) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.16. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

K.4.17 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. There has been no update since the Fall 2023 meeting in Kansas City.

There were no meeting minutes for this liaison activity.

K.4.18 WG C57.153, Guide for Paralleling Regulating Transformers – Mark Tostrud

This working group met on Tuesday and achieved a quorum. The WG approved John Sen (Duke Energy) as vice chair and Zan Kiparizoski (Howard Industries) as secretary,

WG Chair Mark Tostrud (Dynamic Ratings, Inc.) reviewed the PAR and project timeline with the group. A presentation was made on ways to improve and simplify Annex C – Concept of Apparent Circulating Current. Another presentation was made on recommended updates to the references used in the guide. The group also discussed how to define Reverse Power Flow in the guide and recommended actions during reverse power flow conditions.

The complete meeting minutes can be found in Attachment K.4.18. The next in-person meeting is planned for Fall 2024 in St. Louis, Missouri.

K.4.19 Liaison to Entity PAR C57.145, Recommended Practice on Digital Twin Modeling and Analysis based on Spatial-temporal Data of Switch Cabinet and Transformer with 110kV and Below – Brian Sparling

This entity PAR was approved in June 2023. Liaison Brian Sparling (Kinectrics) reported that he and Standards Coordinator Stephen Shull (BBC Electrical Services, Inc.) attended a virtual meeting earlier in 2024. The proposed document sounded more like a specification than a guide. The liaison referred the China-based working group to IEEE PC57.143 (Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Components) but hasn't heard back. The liaison said the next WG call is scheduled for the week of March 18, 2024.

K.4.20 Liaison to Entity PAR "Guide for Power Transformers for Low-frequency (10-30Hz) Power Transmission"

Sheldon Kennedy (Sheldon P. Kennedy Engineering, PLLC), the liaison to this entity PAR, reported that there has been no update since the Fall 2023 meeting in Kansas City.

K.5 Old Business

Transformer Seismic Concerns – IEEE 693 "Amendment"

PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) shared an update that was provided by Bushings Subcommittee Chair Eric Weatherbee (PCORE Electric). According to an email dated February 1, 2024, the proposed IEEE 693 amendment "P693a" will be returned to the working

group and not go through the last approval process. The next document update is expected to be a full revision.

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

Study group chair Hemchandra Shertukde was not present to provide an update on this activity.

K.6 New Business

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

PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) reiterated that any changes in the next revision of IEEE 693 would likely affect power transformer designs. We need volunteers from the Power Transformers and Bushings subcommittees, especially users and transformer manufacturers, to participate in the review and ballot of IEEE 693 once the document is open for revision. Anyone who is interested in getting involved is encouraged to contact the PTSC Chair at ryan.musgrove@ieee.org.

K.7 Adjournment

The meeting adjourned at 2:45 p.m.

K.8 Attachments

Attachment K.1 – Attendance
Attachment K.2 – S24 PTSC Agenda
Attachment K.4.1 – C57.131 (No Meeting)
Attachment K.4.2 – C57.156 Minutes
Attachment K.4.3 – C57.116 (No Meeting)
Attachment K.4.4 – IEEE 638 Minutes
Attachment K.4.5 – C57.135 Minutes
Attachment K.4.6 – C57.143 (No Meeting)
Attachment K.4.7 – C57.12.10 Minutes
Attachment K.4.8 – C57.140 Minutes
Attachment K.4.9 – C57.125 Minutes
Attachment K.4.10 – C57.157 Minutes
Attachment K.4.11 – C57.170 Minutes
Attachment K.4.12 – C57.150 (No Meeting)
Attachment K.4.13 – C57.17 Minutes
Attachment K.4.14 – C57.107 Minutes (No Meeting)
Attachment K.4.15 – 60076-57-1202 Minutes
Attachment K.4.16 – C57.93 Minutes
Attachment K.4.17 – Liaison to PC57.93a (No Meeting Minutes)
Attachment K.4.18 – C57.153 Minutes
Attachment K.4.19 – Liaison to Entity PAR for C57.145 (No Meeting Minutes)
Attachment K.4.20 – Liaison to Entity PAR for Guide for Power Transformers for Low-Frequency Power Transmission (No Meeting Minutes)

Attachment K.1

Attendance Record

Role	First Name	Last Name	Company
Guest	Isaac	Abdalla	HICO America
Member	Kayland	Adams	Prolec GE Waukesha
Guest	Robert	Allison	Dominion Energy
Guest	Edmundo	Arevalo	Bonneville Power Administration
Guest	Elise	Arnold	SGB
Member	Onome	Avanoma	MJ Consulting
Member	Donald	Ayers	Ayers Transformer Consulting
Member	Gilles	Bargone	FISO Technologies Inc.
Guest	Sean	Barker	Hitachi Energy
Guest	Jason	Beaudoin	Weidmann Electrical Technology
Guest	Jean-Noel	Berube	Rugged Monitoring Inc.
Member	Enrique	Betancourt	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	George	Bouty	Delta Star Inc.
Member	Jeremiah	Bradshaw	Bureau of Reclamation
Guest	John	Brett	Delta-X Research Inc.
Guest	Jeffrey	Britton	Doble Engineering Co.
Guest	Samuel	Brodeur	Hitachi ABB Power Grids
Guest	Duane	Brown	Measurements International
Guest	Juan Alfredo	Carrizales	Prolec GE
Member	Juan	Castellanos	Prolec GE
Member	Stuart	Chambers	EPRI
Guest	Vivian	Chan	Hitachi Energy
Guest	Luiz	Cheim	Hitachi Energy
Member	Craig	Colopy	Retired - General Interest
Guest	Michael	Craven	Qualus Corp.
Member	Juan Carlos	Cruz Valdes	Prolec GE
Guest	Marcos	Czernorucki	Hitachi Energy
Member	Eric	Davis	Consultant
Guest	Samson	Debass	EPRI
Guest	Gabriel	Delgado	Invenergy
Member	Scott	Digby	Duke Energy

Guest	Nikolaus	Dillon	Dominion Energy
Guest	Luc	Dorpmanns	Royal SMIT Transformers
Guest	Lee	Doyle	Vaisala
Guest	Zachary	Draper	Delta-X Research Inc.
Guest	Jesse	Duffy	Nashville Electric Service
Member	Hakim	Dulac	Advanced Power Technologies
Member	Samragni	Dutta Roy	Siemens Energy
Guest	Eric	Elson	SDGE
Member	Evgenii	Ermakov	Hitachi Energy
Guest	Marco	Espindola	Hitachi Energy
Member	Reto	Fausch	RF Solutions
Guest	Miguel	Fernandez	Braintree Electric Light Dept.
Member	Marcos	Ferreira	Quanta Technology
Member	Hugo	Flores	Hitachi Energy
Member	Bruce	Forsyth	Cargill
Guest	Patrick	Foster	NextEra
Guest	Raymond	Frazier	Ameren
Guest	Yao	Fu	BC Hydro
Guest	Jose	Gamboa	H-J Family of Companies
Member	Eduardo	Garcia Wild	Siemens Energy
Guest	Miguel	Garcia Wild	Hitachi Energy
Guest	James	Gardner	Prolec GE Waukesha
Member	Rob	Ghosh	General Electric
Guest	Eduardo	Gomez Hennig	Siemens Energy
Guest	Luis	Gonzalez	Conduct Industries
Guest	Alireza	Gorzin	Black & Veatch
Guest	Brad	Greaves	Weidmann
Member	Bill	Griesacker	William Griesacker and Associates
Guest	Detlev	Gross	Power Diagnostix Consult GmbH
Member	Ismail	Guner	Hydro-Quebec
Member	Attila	Gyore	M&I Materials Ltd
Guest	Didier	Hamoir	Transformer Protector Corp
Guest	Kevin	Hampton	Siemens Energy
Member	Kyle	Heiden	EATON Corporation
Guest	Peter	Heinzig	Weidmann Electrical Technology
Guest	Florian	Hermann	Trench France
Guest	Ronald	Hernandez	Doble Engineering Co.
Member	Gary	Hoffman	Advanced Power Technologies
Member	Saramma	Hoffman	PPL Electric Utilities
Member	Ryan	Hogg	Bureau of Reclamation

Guest	Derek	Hollrah	Burns & McDonnell
Member	Philip	Hopkinson	HVOLT Inc.
Guest	Patrycia	Jarosz	IEEE SA
Guest	Marion	Jaroszewski	Delta Star Inc.
Guest	Nicholas	Jensen	Delta Star Inc.
Guest	Chanmin	Jeong	HD Hyundai
Member	John	John	Virginia Transformer Corp.
Guest	Christopher	Johnson	Oncor Electric Delivery
Guest	Kevin	Juchem	Hitachi Energy
Member	Kurt	Kaineder	Trench Austria
Guest	Jerzy	Kazmierczak	Hitachi Energy
Member	Sheldon	Kennedy	Sheldon P. Kennedy Engineering, PLLC
Guest	Stacey	Kessler	Ulteig
Guest	Yeamsoo	Kim	MEPPI
Member	Egon	Kirchenmayer	Siemens Energy
Member	Dmitriy	Klempner	Southern California Edison
Guest	Krzysztof	Kulasek	Delta Star Inc.
Guest	Petra	L'Abbe	Sherwin Williams
Guest	Donald	Lamontagne	Arizona Public Service Co.
Guest	Fernando	Leal	Prolec GE
Guest	Junho	Lee	Hyundai Electric
Guest	Angela	Leigl	EATON Corporation
Guest	Jinming	Li	BC Hydro
Secretary	Weijun	Li	Braintree Electric Light Dept.
Guest	Eric	Li	BC Hydro
Guest	Cesar	Lizcano	Shell USA, Inc.
Guest	Luc	Loiselle	Tetra Tech
Guest	Ricardo	Lopes	Efacec Energia, SA
Guest	Xose	Lopez-Fernandez	Universidade de Vigo
Guest	Tiffany	Lucas, P.E.	SPX Transformer Solutions, Inc.
Guest	Jose	Machain	Prolec GE
Guest	Jinesh	Malde	M&I Materials Inc.
Guest	Gabriel	Mamede	Siemens Energy
Member	Kumar	Mani	Duke Energy
Guest	Alberto	Martinez	WEG
Guest	James	McBride	JMX Services, Inc.
Member	Thomas	Melle	HIGHVOLT
Guest	Toni	Mellin	Vaisala
Guest	Yegor	Melo	BC Hydro
Guest	Filip	Mikulecky	Siemens Energy KPT

Member	Francis	Mills	Power Engineers, Inc.
Guest	Juliano	Montanha	Siemens Energy
Member	Emilio	Morales-Cruz	Qualitrol Company LLC
Guest	Marta	Munoz	Hitachi Energy
Guest	Emma	Murowinski	Delta-X Research Inc.
Member	David	Murray	Tennessee Valley Authority
Chair	Ryan	Musgrove	Oklahoma Gas & Electric
Guest	Anthony	Natale	HICO America
Guest	Kelly	Naunton	BC Hydro
Member	Kristopher	Neild	Megger
Guest	Mark	Newbill	Hitachi Energy
Guest	Yaw	Nyanteh	Hyosung HICO
Guest	Mirna	Olic	Siemens Energy KPT
Member	Anastasia	O'Malley	Consolidated Edison Co. of NY
Guest	Dwight	Parkinson	EATON Corporation
Guest	Monil	Patel	Pacific Gas & Electric
Guest	Harry	Pepe	Phenix Technologies, Inc.
Guest	Goran	Plisic	Siemens Energy KPT
Guest	Christoph	Ploetner	Siemens Energy
Guest	Dominic	Pollaro	NASS
Guest	Daniel	Posadas	Prolec SA DECV
Guest	Bertrand	Poulin	Hitachi Energy
Guest	Pedro	Puente	Prolec GE
Member	Ion	Radu	Hitachi Energy
Guest	Farnoosh	Rahmatian	NuGrid Power Corp
Guest	Timothy	Raymond	Electric Power Research Institute (EPRI)
Member	Scott	Reed	MVA
Guest	Sebastian	Rehkopf	Maschinenfabrik Reinhausen
Guest	Jonathan	Reimer	FortisBC
Guest	Michael	Richardson	Ameren
Guest	Tim	Rocque	Prolec GE Waukesha
Guest	Rodrigo	Ronchi	WEG-Voltran
Guest	Yuri	Rossini	Siemens Energy
Member	Marnie	Roussell	Entergy
Member	Mickel	Saad	Hitachi Energy
Member	Hakan	Sahin	Virginia/Georgia Transformer
Member	Dinesh	Sankarakurup	Duke Energy
Guest	Amitabh	Sarkar	Virginia Transformer Corp.
Guest	Garret	Sarkinen	Xcel Energy
Member	Daniel	Sauer	EATON Corporation

Member	Alan	Sbravati	Hitachi Energy
Member	Markus	Schiessl	SGB
Guest	Eric	Schleismann	Southern Company Services
Guest	Alfons	Schrammel	Siemens Energy
Member	Ewald	Schweiger	Siemens Energy
Guest	Harman	Sekhon	PTI Transformers
Member	Cihangir	Sen	Duke Energy
Member	Adam	Sewell	Quality Switch, Inc.
Member	Abdul Majid	Shaikh	Delta Star Inc.
Member	Stephen	Shull	BBC Electrical Services, Inc.
Guest	Andre	Simons	Cogent Power Inc.
Guest	Jonathan	Sinclair	Black & Veatch
Guest	Yong Tae	Sohn	Hyosung HICO
Member	William	Solano	Reinhausen Manufacturing Inc.
Guest	Markus	Soller	Power Diagnostix Systems
Member	Sanjib	Som	Pennsylvania Transformer
Guest	Mauricio	Soto	Hitachi Energy
Guest	Brian	Sparling	Kinectrics
Member	Fabian	Stacy	Hitachi Energy
Member	Brad	Staley	Leeward Energy
Member	Markus	Stank	Maschinenfabrik Reinhausen
Member	Kyle	Stechschulte	American Electric Power
Guest	Hampton	Steele	Tennessee Valley Authority
Guest	Andrew	Steineman	Delta Star Inc.
Guest	Christopher	Steineman	Hubbell/Meramec Inst.
Guest	Charles	Sweetser	OMICRON electronics Corp USA
Member	Craig	Swinderman	Mitsubishi Electric Power Products
Guest	Matthew	Sze	OMICRON electronics Corp USA
Guest	Sachin	Tade	PTI Transformers
Guest	Jonathan	Tan	Northern Transformer
Member	Troy	Tanaka	Burns & McDonnell
Guest	Marc	Taylor	JFE Shoji Power Canada Inc.
Guest	Ed	teNyenhuis	Hitachi Energy
Guest	Marko	Teofanovic	Ontario Power Generation
Guest	Andreas	Thiede	Highvolt
Guest	Scott	Thomas	Hitachi Energy
Member	Ryan	Thompson	Burns & McDonnell
Guest	Timothy	Tillery	Howard Industries
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Guest	Bjorn	Vaagensmith	Idoho National Laboratory

Vice-Chair	Alwyn	Van Der Walt	Electrical Consultants, Inc.
Guest	Cole	Van Dreel	American Transmission Co.
Guest	John	Vandermaan	BC Hydro
Member	Ajith	Varghese	Prolec Energy
Member	Jason	Varnell	Doble Engineering Co.
Member	Rogerio	Verdolin	Verdolin Solutions Inc.
Guest	Karsten	Viereck	Maschinenfabrik Reinhausen
Guest	Dharam	Vir	Prolec GE
Member	Richard	vonGemmingen	Dominion Energy
Member	Pragnesh	Vyas	Sunbelt-Solomon
Guest	(Hugh) Mike	Waldrop	Memphis Light, Gas & Water
Member	David	Wallach	Duke Energy
Member	Joe	Watson	JD Watson and Associates Inc.
Guest	Joshua	Watson	NPPD
Member	Bruce	Webb	Knoxville Utilities Board
Guest	Matthew	Weisensee	PacifiCorp
Guest	Drew	Welton	Intellirent
Member	Daniel	Weyer	Monolith
Guest	Joe	White	Power Engineers
Guest	Christopher	Whitten	Hitachi Energy
Member	Trenton	Williams	Advanced Power Technologies
Guest	Deanna	Woods	Alliant Energy
Member	Jeffrey	Wright	Duquesne Light Co.
Guest	Fei	Yang	Hitachi Energy
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

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 (no meeting) ..... Craig Colopy
    b. WG C57.156, Guide for Tank Rupture Mitigation ..... Peter Zhao
    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
    e. WG C57.135, Guide for Phase shifting Transformers ..... Ewald Schweiger
    f. WG Revision of C57.143, Monitoring Guide (no meeting) ..... Mike Spurlock
    g. TF Std Requirement for Liquid-Immersed Power TR – C57.12.10 ..... Scott Digby
    h. TF Guide for Evaluation & Reconditioning of Liquid Immersed TR C57.140 ..... Sanjib Som
    i. WG Revision of C57.125, Failure Investigating and Reporting ..... Hakan Sahin
    j. WG C57.157, Guide for Life test of Switch Contacts ..... Adam Sewell
    k. WG C57.170, Condition Assessment Guide ..... Kumar Mani
    l. WG Revision of C57.150, Transportation Guide (No meeting) ..... Greg Anderson
    m. WG C57.17, Standard Requirements for Arc Furnace Transformers ..... Dom Corsi
    n. WG C57.107, Transformer Volts per Hertz (No meeting ..... Joe Watson
    o. TF Liquid Immersed Phase-Shifting Transformers 60076-57-1202 ..... Ewald Schweiger
    p. TF C57.93, Installation and Maintenance Guide ..... Scott Reed
    q. Liaison to PC57.93a – Installation and Maintenance Guide ..... Scott Reed
    r. WG C57.153, Guide for Paralleling Transformers ..... Mark Tostrud
    s. Liaison to Entity PAR C57.145 – Digital Twin for Power Equipment (DTPE) ..... Brian Sparling
    t. Liaison to Entity PAR Guide for PT for Low-Frequency Power Transmission ..... Sheldon Kennedy
8. Old business
    a. Transformer Seismic Concerns – IEEE 693 “Amendment” – Eric Weatherbee
    b. Discussion on the creation of a new IOT Document – Sanjib Som/Hemchandra Shertukde
9. New business
    a. IEEE 693 Recommended Practice for Seismic Design of Substations – Substations Standards Committee – Need volunteers, especially users and transformer manufacturers.
10. Adjournment

Attachment K.4.2

Title: WG Guide for Tank Rupture Mitigation PC57.156
Time: 9:30 AM- 10:45 AM, Monday, March 11, 2024
Place: Hyatt Regency Vancouver, Vancouver, BC, Canada
Chair: Peter Zhao **Vice-Chair:** Samuel Brodeur **Secretary:** Hakim Dulac

1. **Call to Order at 9:30 AM**
    a. Chair's Remarks
    b. IEEE-SA Policies
        i. Call for Essential Patents slide presented. There were no patent claims made.
        ii. Copyright policies slide presented.

2. **Welcome and Introduction**
    a. Introduction
    b. Roster circulation
    c. Quorum Check

WG active member	Member required for Quorum (> 50%)	Member present	Total attendance (Guest and member)	Quorum established
34	18	13	55	No

3. **Approval of Meeting Minutes**
    a. Motion to accept minutes of the fall 2023 meeting (Kansas City).
        i. Moved: Martin Munoz
        ii. Seconded: David Murray
        iii. No objections from the floor. No quorum, so the Fall 2023 minutes remain unapproved.

4. **Technical Topics**
    a. Review and Discussion of Comments and Proposed Changes.
        i. Comments # 1 to 7 were discussed.
    b. Further actions and assignments:
        i. Discussion on the possible merger of section 4.1.2 (*4.2.2) and 4.1.3 (*4.2.3). Samuel Brodeur, Sanjib Som, and Enrique Betancourt volunteered to work on a proposal and will present it at the next meeting.
        *Section number on the published standard document C57.156-2016.
        ii. Marc Foata will revise 5.2 and come with a proposal for the next meeting.
        iii. Discussion on section 5.3. Marc Foata, Chris Johnson, Ryan Musgrove and Didier Hamoir volunteered to come with a proposal for the next meeting. A comment was made to replace "thousands" saves by "numerous" saves in the PRD section.
        iv. Figure 1 is the flow rate under air quoted as a reference, and Emilio Morales to check if the flow rate under insulating oil is available.

5. **New Business -** None
6. **Meeting adjourned at 10:45AM**
7. **Next Meeting**
    a. St. Louis, Missouri, March 2024

Reported by:

Hakim Dulac, P.Eng.
WG Secretary
Attendance:

Name	Affiliation	Member (yes, no or requested)
Anastasia O'Malley	Con Edison NY	yes
Andy Steineman	Delta Star	no
Christopher Johnson	Oncor	Yes
Craig Colopy	Retired from Eaton	no
Craig Swinderman	MEPPI	no
David Murray	TVA	yes
Derek Hollrah	Burns&McDonnell	requested
Didier Hamoir	Transformer Protector CORP.	requested
Emilio Morales Cruz	Qualitrol	requested
Enrique Betancourt	Prolec-GE	no
Eric Davis		no
Eric Schleismann	Southern Company	no
Filip Mikulecky	Siemens Energy KPT	requested
Francis Mills	Power Engineers	requested
Hakim Dulac	APT	**Secretary**
Hector Garza	Orto de Mexico	no
Ismael Guner	Hydro Quebec	no
James Gardner	Prolec-GE Waukesha	no
Jean Philippe Gagnon	Qualitrol	no
Jeff Gragert	XCEL Energy	no
Jerzy Kazmierczak	Hitachi Energy	requested
Joe Nims	Allen& Hoshall	no
Joe Watson	JDWatson & Associates	yes
Jon Bender	WEGAI Research LLC	no
Jose Luis Machain	Prolec GE	requested
Joshua Yun	Virginia Transformer	yes
Junho Lee	Hyundai Electric	requested
Kelly Naunton	BC Hydro	no
Kevin Juchem	Hitachi Energy	no
Krzysztof Kulasek	Delta Star	no
Luc Loiselle	Tetra Tech	requested
Marc Foata	MR	yes
Martin Munoz	Orto de Mexico	requested
Michal Swiatkowski	Hitachi Energy	requested
Mike Waldrop	MLGKL	no
Mirna Olic	Koncar Power Transformers	no

Omar Mendez	Prolec	no
Patrycja Jarosz	IEEE SA	no
Peter Zhao	Hydro One	**Chair**
Rafal Kowalski	Hitachi Energy	no
Ricardo Castro Lores	Efacec Transformers	no
Richard Vongemminen	Dominion Energy	no
Robert Middleton	RHM International	yes
Robert Vary	Reinhausen Manufacturng	no
Ryan Musgrove	Oklahoma Gas & Electric	no
Samson Debass	EPRI	yes
Samuel Brodeur	Hitachi Energy	**Vice-Chair**
Samuel Lewis	Hitachi Energy	no
Sanford Fong	Georgia Power	no
Sanjib Som	PTT, LLC	yes
Sebastian Rehkopf	MR	no
Sergiusz Kapka	Hitachi Energy	no
Shankar Subramany	Kema labs	requested
Stacey Kessler	Ulteig Engineers	no
Yegor Melo	BC Hydro	no

Document #: **638**

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

Chair: Craig Swinderman Vice Chair
Secretary: Percent Complete: 10%

Meeting Date: Monday, March 11, 2024 Time: 11:00 am to 12:15 pm.
Location: Hyatt Regency; Vancouver, BC, Canada – Regency B room.

Current draft being worked on: 1.0 Dated: February 2024
PAR Expiration date: December 31, 2027

Attendance:	Members:	6 of 9
	Guests:	24
	Guests requesting membership:	3
	Total*:	30

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

Meeting Minutes / Significant Issues / Comments:

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

2. Presentation of Agenda:
   The Agenda for the meeting was submitted for review in advance of the meeting.

3. Presentation of IEEE Standards Slides:
   IEEE Essential Patent Slides and Copyright policy were presented, and no issues received from the attendees.

4. Distribution of attendance sheets:
   a. Attendance was taken with a paper roster.
   b. Please send an email to craig.swinderman@meppi.com with the subject: P638 EMAIL to be added to the P638 email list.

5. Checking the Quorum:

a. 6 out of 9 members were in attendance of the meeting so quorum was achieved.

6. Approval of the Meeting Minutes from Kansas City Fall 2023 and Agenda for Spring 2024:
    a. Approval of the Fall 2023 meeting unapproved minutes
        i. Hemchandra Shertukde motioned to approve
        ii. Robert Allison seconded
        iii. Motion was carried unanimously with no objections or abstentions. – Approved.
    b. Approval of the Spring 2024 agenda
        i. Hemchandra Shertukde motioned to approve
        ii. Robert Allison seconded
        iii. Motion was carried unanimously with no objections or abstentions. – Approved.

7. Chair announcements:

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

8. Old work:

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

    More than 40 changes identified from 323-2003 document to the 2016 revision. Much of the wording matched, but needed to have further detailed reviews of specific sections. These reviews are in progress. Chair called for other volunteers to assist with reviews. 323-2003 will be due for re-issue by December 2026, so we need to be aware of those potential changes.

Chair showed changes in summary between 323-2003 version compared to 2016 revision. Specifically into new sections 7.2.6.3, 7.2.6.4, and 7.4.1.10 is a new section on accident conditions.

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

John Pender added as a seismologist that there is no significance of movements beyond 30, or even 20 Hz, so this range change may not have a significant or major impact to the overall revision of 638.

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

Chair produced and displayed outline for P638 D1.

Request made to include GMD events to correlate with earthquakes in this review.

Chari noted Sections 5 (Approaches to Transformer Qualifications) and 6 (Design Qualification Procedure) need to be reviewed for updating based on changes to 323 and 344.

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

9. New Work:

Dominic Pollaro and Robert Allison volunteered as taking leadership on revisions to section 5 and section 6 of P638 draft (respectively).

Chair plans to have revisions from these included in the next updated draft of P638 to be present for review at the next meeting.

10. Next meeting: October 28, 2024 at the Fall 2024 Transformers Committee Meeting scheduled for October 27-31, 2024 St. Louis, MO, USA.

11. Close of meeting:
The meeting adjourned at 12:00 pm

Submitted by: Craig Swinderman Date: March 12, 2024

List of Meeting Attendees at Spring '24 Meeting, including affiliation & voting member status.

Name	***Company***	***Role***
Robert Allison	Dominion Energy	Member
Javier Arteaga	Hitachi Energy	Member
Elizabeth Bray	Southern Company	Member
Alfredo Carrizales	Prolec GE	Guest
Yuan Grace	Hitachi Energy	Guest
Robert Middleton	RHM International	Guest
Ryan Musgrove	Oklahoma Gas & Electric	Member

Name	***Company***	***Role***
Hem Shertukde	University of Hartford	Member
Craig Swinderman	Mitsubishi Electric Power Products, Inc.	Member
Jon Bender	WE Gundy and Associates, Inc.	Guest
Yeounsoo Kim	Mitsubishi Electric Power Products, Inc.	Guest
Marnie Roussell	Entergy	Guest
Matthew Sze	Omicron Energy	Guest
Oscar Castanou	Siemens Energy	Guest
Eric Schleismann	Southern Company	Guest
Jason Beaudoin	Weidmann	Guest
Kevin Hampton	Siemens Energy	Guest
Stefan Lembacher	Siemens Energy	Guest
Aron Sextan	Kinectrics	Guest
Arno Dumke	Brackhaus Measurements	Guest
Duane Brown	Measurements International	Guest
Corey Hanson	Flex-Core	Guest
Zach Gagne	IFD Technologies	Guest

Name	***Company***	***Role***
David Murray	TVA	Guest
Dominic Pollaro	Voltyx	Guest
Paulo Bautista	Enmax	Guest
Kayland Adams	Prolec GE Waukesha	Guest
Tim Rocque	Prolec GE	Guest
Kelly Naunton	BC Hydro	Guest
Bryan Deb	Siemens Energy	Guest
Didier Hamoir	Transformer Protector Corp.	Guest

Attachment K.4.5

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

Chair: Ewald Schweiger
Secretary: Richard von Gemmingen

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

1. Meeting was called to order at 1:45 PM (PDT) on Tuesday March 12th, 2024 with Welcome & Chair's remarks
2. Attendance: 50
   Members: 13
   Guests: 37
3. Call for essential patents
   a) IEEE slides on essential patents have been provided in the meeting invitation, posted on the internet and were shown and a call for essential patents was made.
   → No essential patents or issues were reported.
4. Copyright policy
   b) Slides of the IEEE copyright policy have been provided in the meeting invitation, posted on the internet and were shown and request made to identify any potential copyright issues.
   → No issues were reported.
5. Quorum check
   - A quorum was achieved
     Total number of members is 24 requiring 13 members for quorum.
     First member count had only 12 in attendance. Decision was to have brief review of approved PAR and allow a few minutes for late arrivals. Recount was made and 13 members were present establishing quorum.
6. Approval of agenda
   a) Motion to approve agenda was made by Eric Davis and seconded by Kurt Kaineder.
   No discussion or objections were made.
   b) Motion was carried unanimously with no objections or abstentions.
7. Approval of meeting minutes of the previous Fall 2023 in-person meeting
   a) Motion to approve agenda was made by Eric Davis and seconded by Kurt Kaineder.
   No discussion or objections were made.
   b) Motion was carried unanimously with no objections or abstentions.
8. Discussion of PAR and dual logo. The Phase-Shifting (PST) Guide is now a dual logo IEEE/IEC collaboration was updated.
   a) Dual logo document will have the document number IEC/IEEE 60076-57-135
   b) Guide will need to be aligned with IEEE C37.245 (IEEE Guide for the Application of Protective Relaying for Phase-Shifting Transformers) for consistency of definitions etc.
   c) Liaison for C37.245 is Michael Thompson. Mr. Thompson was not able to be present at today's meeting.
   d) IEC does not allow the use of the word Guide. The PAR will have to be amended to change the word Guide to a term that is acceptable to IEC.
      i. Discussion on this indicated that IEC will accept Guideline, however IEEE may not recognize Guidelines.

ii. Craig Colopy pointed out that a dual logo document for tap changers was recently developed and has the title Guidelines which was accepted by both IEC and IEEE.

9) IEC/IEEE 60076-57-135 presented by Kevin Juchem and Ewald Schweiger
   a) Accounting of PST guide and protection guide needs to be done for conformity of descriptions etc.
   b) Volunteers for section comments are needed.
   c) Comparison and suggestions for finalization are needed.
   d) Clauses 1-6
      i. Clause 3: The alignment between IEC and IEEE has been successfully established.
      ii. Clause 5: Subclause 5.4. Protection requires a review.
      iii. Clause 6: Sebastian Rehkopf and Matthias Spaeth will review rating data.
   e) Clauses 7 -12
      i. Clause 7: Construction Rich von Gemmingen will review.
      ii. Clause 9: Control systems. General question if this section should remain in document.
      iii. Clause 10 – 11: Luc Dorpmanns and Jos Veens.
      iv. Clause 12: Bid document checklist needs review and comment.
      v. Clauses 4,5,6 and 12: Received very valuable inputs from Joe Watson

10) Clause 3 presentation by Luc Dorpmanns
   a) Definitions for windings (Excitation and exciting and series): Suggestion is to stick with standard as is
   b) Discussion on two types of PST, single core section 3.11 and two core section 3.12
      i. Luc summed up the 4 types of PST configurations by color coding to explain examples.
      ii. One suggestion is to use this presentation to explain the examples already in guide.
      iii. Some diagrams are not in standard and suggest adding these diagrams for the 2 core.
         (1) Example D regulating, series, HV winding and LV winding.
         (2) Example F two core auto transformer
      iv. Other Suggestions
         (1) add more diagrams with clearly identified winding names,
            1. clarify purpose of windings in text.
         (2) add more vector diagrams.
      v. Kevin Juchem commented that some of this might belong in the standard. If standard is open for revision this should be referred to the standard.
      vi. Kurt Kaineder also agreed this should be in the standard.
      vii. Group meeting for standard review is scheduled for Tuesday 3/12 at 1:45

11) Group number 6 presentation from Sebastian Rehkopf with contributions from Matthias Spaeth
   a) From manufacturing perspective suggest adding rated impedance to definitions
   b) Kevin Juchem filling in for Matthias Spaeth presented his comments.
      i. Terminal markings in guide are not same as in standard.
      ii. Angle is referred to as “delta” in C37.245 and as “alpha” in C57.135 should C57.135 adopt same nomenclature as in C37.245.
      iii. Several examples designate S (source), L (load) and clockwise vs. counterclockwise. It would be good to know why. Should discuss with Michael Thompson from the C37.245 perspective.

12) Joe Watson provided list of wording for multiple clauses.

13) The chair called for volunteers to work on Guide and participants to reach out for volunteers. Plan is to have one or more virtual meetings before St. Louis meeting in Fall 2024.

14) The chair opened the floor for opinions and next steps.

a) Joe Watson asked if we were dropping controls sections? As this is not decided Joe made case to keep it specifically for protection from exceeding retard capabilities etc.

b) Kevin Juchem asked as this is a guide, how do we avoid overlording the standard? Commented that he does not think section 9.3 is needed.

c) Joe Watson agreed if test code is in another standard, should just refer to other standard.

d) Joe Watson/ Ewald Schweiger suggest appointing a protective study with C37.245

e) No other discussion

15) The chair requested for interim meetings that members or guests who want to lead a TF for a chapter reviews/edits reach out to the chair or secretary. The Guide C57.135-2011 in Word Format is available (post on PTSC Internet site)

a) Luc Dorpmanns volunteered for definitions in sections 3, 10, and 11.

b) Joe Watson asked if we are changing from guide to guidelines will we have to change "shall's" to "may" or "can" etc.

c) Gary Hoffman stated that IEEE only has PAR for Guides, Recommended Practices, and Standards but do not have PAR for Guidelines and this may be difficult to get changed without lots of explanations.

d) Craig Colopy pointed out that a Dual Logo for Tap Changing was recently completed as a Guideline so a precedent exists.

e) Gary Hoffman asked if guideline has "should" and "mays" and minimized "shalls"

16) The chair opened floor for discussions on old business.
- No old business was brought up.

17) The chair opened floor for discussions on new business.
- No new business was brought up.

18) The chair promoted upcoming new study group *60076-57-1202 Liquid immersed Phase-Shifting Transformers* IEC/IEEE – PST Standard meeting for Tuesday, March 12th, 2024.

19) The meeting was adjourned at 2:30 PM

20) Next meetings (planned):

2. Virtual meeting – to be scheduled before October 2024 in St Louis, MO

In-person meeting – October 28 or 29, 2024 in St Louis, MO

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

List of attendees for this meeting:

Name	Last name	First name	Company / Affiliation	Status
Sean Barker	Barker	Sean	Hitachi Energy	G
Jason Beaudoin	Beaudoin	Jason	Weidmann Electrical Technology	G
Jon Bender	Bender	Jon	W.E. Gundy & Associates	G
Jean-Noel Berube	Berube	Jean-Noel	Rugged Monitoring	G
Oscar Castanon Barragan	Castanon Barragan	Oscar	Siemens Energy Canada LTD	G
Vivian Chan	Chan	Vivian	Hitachi Energy	G
Craig Colopy	Colopy	Craig	Retired	G

Name	Last name	First name	Company / Affiliation	Status
Marcos Czernorucki	Czernorucki	Marcos	Hitachi Energy	G
Eric Davis	Davis	Eric	Consultant	M
Luc Dorpmanns	Dorpmanns	Luc	Royal SMIT Transformers B.V.	G
Eric Elson	Elson	Eric	SDGE	G
Ken Fedor	Fedor	Ken	SGB-Smit Group	G
Jean Philippe Gagnon	Gagnon	Jean Philippe	Qualitrol	G
Eduardo Gomez-Hennig	Gomez-Hennig	Eduardo	Siemens Energy	G
Didier Hamoir	Hamoir	Didier	Transformer Protector Corp	G
Kyle Heiden	Heiden	Kyle	EATON Corporation	G
Peter Heinzig	Heinzig	Peter	Weidmann Electrical Technology	G
Gary Hoffman	Hoffman	Gary	Advanced Power Technologies	G
Saramma Hoffman	Hoffman	Saramma	PPL	G
Patrycia Jarosz	Jarosz	Patrycia	IEEE SA	G
Kevin Juchem	Juchem	Kevin	Hitachi Energy	M
Kurt Kaineder	Kaineder	Kurt	Trench Austria	M
Stefan Lembacher	Lembacher	Stefan	Siemens Energy	G
Ricardo Lopes	Lopes	Ricardo	Efacec Transformers	G
Omar Mendez Zamora	Mendez Zamora	Omar	Prolec GE	M
Ryan Musgrove	Musgrove	Ryan	OG+E	M
Kelly Naunton	Naunton	Kelly	BC Hydro	G
Kris Neild	Neild	Kris	Megger	G
Anastasia O'Malley	O'Malley	Anastasia	Con Edison	G
Parminder Panesar	Panesar	Parminder	Virginia Transformer Corporation	G
Sebastian Rehkopf	Rehkopf	Sebastian	Maschinenfabrik Reinhausen GmbH	M
Alfons Schrammel	Schrammel	Alfons	Siemens Energy	M
Ewald Schweiger	Schweiger	Ewald	Siemens Energy	M
Hemecaosdra Shertukde	Shertukde	Hemecaosdra	University of Hartford	G
Markus Stank	Stank	Markus	Maschinenfabrik Reinhausen	M
Kyle D Stechschulte	Stechschulte	Kyle D	AEP	M
Shankar Subramany	Subramany	Shankar	KEMA Labs	G
Craig Swinderman	Swinderman	Craig	Mitsubishi Electric	G
Scott Thomas	Thomas	Scott	Hitachi Energy	G
Robert Vary	Vary	Robert	Reinhausen Manufacturing Inc.	G
Karsten Viereck	Viereck	Karsten	Maschinenfabrik Reinhausen	G
Dharam Vir	Vir	Dharam	Prolec GE Waukesha	G
Richard von Gemmingen	von Gemmingen	Richard	Dominion Energy	M
John Wagner	Wagner	John	American Electric Power	G
Alan Washburn	Washburn	Alan	Burns & McDonnell	G
Joe Watson	Watson	Joe	JD Watson and Associates Inc.	M
Matthew Weisensee	Weisensee	Matthew	Pacificorp	G
Joe White	White	Joe	Power Engineers	G
Trenton Williams	Williams	Trenton	Advanced Power Technologies	M
Guang Yuan	Yuan	Guang	Hitachi Energy	G

- Guests requesting membership
  Of the 37 guests, there were 7 new membership requests. Five of the requesters did not meet the requirements for membership at this time.
  Two of the requesters (Luc Dorpmanns and Saramma Hoffman), were granted membership after the meeting.

Attachment K.4.7

TF for the Revision of C57.12.10
IEEE Standard Requirements for Liquid-Immersed Power Transformers

3:15 p.m. – 4:30 p.m. Pacific Time, Monday, March 11, 2024
Hyatt Regency Vancouver, Vancouver, CA

Unapproved Meeting Minutes

TF Chair Scott Digby called the meeting to order at 3:15 p.m., Monday, March 11, 2024. As this was the first meeting of this new TF the other officer roles had not yet been established or filled.

Total Attendance	64
Attendees Requesting Membership	23 (membership granted thus quorum achieved)
Guests in Attendance	41
Guests Requesting Membership	N/A (first meeting of this activity)

The meeting attendance list is included at the end of these minutes.

The TF Chair reviewed the group's task statement, with the directive from the SC being to determine how to move forward with a PAR between Sp-24 and Fa-24 with the objective to meet as WG in Fa-2024, so the task being to "Draft a Project Authorization Request (PAR) for consideration by the Sponsor." It was noted that the active document was published in 2017 so expires 12/31/2027 (~3.5 years from now).

A proposed meeting agenda was presented by the TF Chair, with there being no comments so the meeting proceeded accordingly.

The TF membership rules per the P&P Manual were reviewed. Attendance rosters were circulated, with attendees being advised that as this is the first meeting of this group that those requesting membership on the roster would be granted membership.

The TF Chair made the requisite Call for Patents and there were none noted by those present. The TF Chair presented the IEEE-SA Copyright Policy slides as well as the IEEE-SA activity participant behavior slides.

The TF Chair provided a high-level review of the timeline of the prior revision cycle, which began as a WG in Spring-2015, with the balloting process concluding in 2017 thus the latest document having a 2017 publication date.

The TF Chair presented the Existing Title and Scope for discussion. There was consensus that the existing document Title does not need any revision. Regarding the existing Scope, there was some general discussion that concluded with the consensus that:

- Reference specifically to autotransformers is not necessary since they are inherently in scope because they are not listed in the exclusion list.
- Text referring to being "remotely or integrally associated with either primary switchgear or substations" be removed since did not seem to add any actual context or value.
- Reference to step-down/step-up removed since is not specifically needed within the scope.
- Removing reference to "induction voltage" regulators, as it was noted as being an antiquated term.

It was noted that the current, published document includes a Purpose section, however, the content of that section would more appropriately be considered a "Word Usage" clause under the standard IEEE document template. As such it was decided that the PAR documentation will <u>not</u> include a Purpose statement/section.

At the conclusion of the discussion, A Motion was made by Joe Watson and Seconded by Trent Williams to approve recommending to the SC to proceed with PAR submittal with the Title and Scope as stated below:

Title:

IEEE Standard Requirements for Liquid-Immersed Power Transformers

Scope:

This voluntary consensus standard sets forth the requirements for power transformer application. This standard is intended to be used as a basis for performance, interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment.

This document is a product standard that covers certain electrical, dimensional, and mechanical characteristics of 50 Hz and 60 Hz liquid-immersed power transformers base rated as follows: 833 kVA and above single-phase, 750 kVA and above three-phase.

This standard applies to all liquid-immersed power transformers that do not belong to the following types of apparatus:

a) Instrument transformers

b) Step voltage regulators

c) Arc-furnace transformers

d) Rectifier transformers

e) Specialty transformers

f) Grounding transformers

g) Mobile transformers

h) Mine transformers

The motion was approved unanimously. The TF Chair indicated that he would make the requisite Motion at the upcoming Power Transformers SC meeting to obtain approval of the SC to proceed with PAR submittal as recommended by the TF.

This group would intend to meet during the Fall-2024 Transformer Committee meetings in St. Louis as a WG if the PAR is approved by that time.

The meeting was adjourned.

Respectfully Submitted,
Scott Digby, TF Chair

First Name	Last Name	Company Name	Requested and Granted Membership?
Tom	Aikens	Delta Star	
Daniel	Aleksandro…	Hitachi Energy	
Gilles	Bargone	Fiso	Y
Sean	Barker	Hitachi Energy	
Jean-Noel	Berube	Rugged Monitoring	
Dan	Blaydon	Baltimore Gas & Electric	
William	Boettger	Boettger Transformer Consulting LLC	Y
Samuel	Brodeur	Hitachi Energy	
Juan Alfredo	Carrizalos	Prolec-GE	
Anthony	Coker	Midel	
Craig	Colopy	EATON Corporation	
Marcos	Czernorucki	Hitachi Energy	
Gabriel	Delgado	Invenergy	Y
Hamoir	Didier	Transformer Protector Corp	Y
Scott	Digby	Duke Energy	Y
Hakim	Dulac	Advanced Power Technologies	Y
Janko	Dzodon	Koncar D&ST	
Marc	Foata	Reinhausen	Y
Jean-Philippe	Gagnon	Qualitrol	
Rob	Ghosh	General Electric	Y
Luis	Gonzalez	Canduct Industries	Y
Attila	Gyore	Midel & Midel Fluids	
Juan Carlos	Hernandez-	GT-NEETRAC	
Gary	Hoffman	Advanced Power Technologies	Y
Saramma	Hoffman	PPL	Y
Marion	Jaroszewski	Delta Star Inc.	
Chanmin	Jeong	HD Hyundai Electric	
John	John	Virginia Transformer Corp.	Y
Kevin	Juchem	Hitachi Energy	
Stacey	Kessler	ULTEIG Engineer	Y
Yeounsoo	Kim	MEPPI	
Dmitry	Klempner	SCE	Y
Mitija	Koprivnjak	Koncar D&ST	
Anton	Koshel	Delta Star Inc.	
Rafal	Kowalski	Hitachi Energy	

Junho	Lee	HD Hyundai Electric	
Angela	Leigl	Eaton	
Eric	Li	BC Hydro	
Jinming	Li	BC Hydro	
Jose Luis	Machain	Prolec-GE	
Brian	McCarrick	Virginia Transformer Corp	
Ryan	Musgrove	Oklahoma Gas & Electric	Y
Anthony	Natale	HICO America	Y
Mirna	Olic	Siemens Energy KPT	
Anastasia	O'Malley	Consolidated Edison Co. of NY	
Perry	Reeder	GE	
Michael	Richardson	Ameren	Y
Tim	Rocque	Prolec-GE	Y
Rodrigo	Ronchi	WEG-Voltran	Y
Garrett	SarKinen	Xcel Energy	
Markus	Stank	Reinhausen	
Andrew	Steineman	Delta Star Inc.	
Chris	Steineman	Meremec	
Michal	Swiatkowski	Hitachi Energy	Y
Craig	Swinderman	MEPPI	
Scott	Thomas	Hitachi Energy	
Risto	Trifunoski	Trench Group	
Richard	vonGemmingen	Dominion Energy	
Alan	Washburn	Burns & McDonnell	
Joe	Watson	JD Watson and Associates Inc.	Y
Matthew	Webb	GE Vernova	Y
Trenton	Williams	Advanced Power Technologies	Y
Patrick	Yan	GE Grid	
Peter	Zhao	Hydro One	Y

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

Spring 2024 IEEE Transformers Committee Meeting

Vancouver, B.C., Canada

11 March 2024

UNAPPROVED MINUTES

Chair: Sanjib Som – PTT

Vice-chair: Marcos Ferreira – Quanta Technology

Secretary: Traci Hopkins – H2scan

Meeting Start Time: 1515

SUMMARY:

The chair opened the meeting with an introduction and attendance. There were only 2 members present that attended the virtual meeting 26 FEB 2024. The sign-in sheet was distributed and there was a request for a volunteer to fill the open Secretary position. Traci Hopkins (H2scan) volunteered and was unanimously approved as Secretary of the Task Force.

The chair then reviewed the agenda, required IEEE policies and opened discussions by reviewing Title, Scope and Purpose. Discussion began regarding the Scope and if it needed to be changed. There were concerns that current scope did not accurately reflect what was in the guide and there was a comment that we should ask ourselves "What do we want from this guide that is not present in others?"

Then discussions turned to concerns that the C57.140 and the C57.170 were duplicating information. Brian Sparling (Kinetrics) explained the C57.170 helps the user to know what needs attention by assigning a grade to its condition and the C57.140 provides the user with the How to do it. After much discussion on compare and contrast of C57.140 to C57.170 it was determined that Marcus Ferreira to do assessment of the two standards, John Sinclair – Black & Veatch will help.

There was then a review of the Vancouver meeting attendees that desired membership and they were granted. **Added new members to achieve quorum. 20 members total with 12 present. We have Quorum.**

There was then a motion by Ed teNyenhuis (Hitachi Energy) to keep the title "as is, no changes." It was seconded by Tim Raymond (EPRI). After discussion and a friendly amendment to the motion it was accepted that the motion be modified to change the title to: IEEE Guide for Evaluation and Life Extension of Liquid Immersed Power Transformers.

Voting results: 7 for the motion, 5 against, No abstentions.

The Task Force will meet again in St. Louis at the Fall 2024 meeting.

The meeting was adjourned at 1634. Below is a list of attendees for the Vancouver meeting.

Attendee List for Spring 2024 Meeting:

Role	First Name	Last Name	Company
Secretary	Traci	Hopkins	H2scan
Member	Timothy C.	Raymond	EPRI
Chair	Sanjib	Som	PTT
Vice-chair	Marcos	Ferreira	Quanta Technologies
Member	Luiz	Cheim	Hitachi Energy
Guest	Alan	Sbravati	Hitachi Energy
Member	Scott	Reed	MVA
Member	Ed	teNyenhuis	Hitachi Energy
Guest	Steven	Small	BC Hydro
Guest	Don	Lamontague	Arizona Public Service
Guest	Derek	Hollrah	Burns & McDonnell
Guest	Elizabeth	Bray	Southern Company
Guest	Cory	Hanson	Flex-core
Guest	Deanna	Woods	ATC
Guest	Brian	McBride	Cargill
Guest	Ryan	Jonak	PGN
Guest	Jinesh	Malde	MIDEL
Guest	Brad	Greaves	Weidmann Group
Guest	Robert	Vray	Reinhausen
Member	Michael	Saad	Hitachi Energy
Guest	Kumar	Mani	Duke Energy
Guest	Sanket	Bolar	Oncor
Guest	Lorne	Gara	Shermco
Guest	Mike	Shannon	RSA Magnet Wire
Guest	Guang	Yuan	Hitachi Energy
Guest	Cesar	Lizcano	Shell
Member	Jeremiah	Bradshaw	Bureau of Reclamation
Member	Joe	White	Power Engineers
Member	Emilio	Morales Cruz	Qualitrol
Member	Brian	Sparling	Kinetrics
Guest	James	Gardner	Prolec-GE Waukesha
Guest	Tiffany	Lucas	PROLEC
Guest	Evgenii	Ermakov	Hitachi Energy
Guest	Jeffrey	Wright	Duquesne Light

Guest	Quamar	Jutt	Kruger Products
Guest	Shuhen	Xu	FMGlobal
Guest	John	Sinclair	Black & Veatch

37 TOTAL ATTENDEES
25 GUESTS
12 MEMBERS

Introduction and Attendance:

Quorum was not achieved, only the chair and Traci Hopkins (H2scan) were in attendance since the membership list was created at 1st meeting (virtual: 26 FEB 2024). *See below for original member list.*

List from First meeting (Virtual: 26 FEB 2024)

Role	First Name	Last Name	Company
Member	Jeff	Benach	Meggar
Member	Jesse	Duffy	Nashville Electric Service
Guest	Ryan	Hogg	Bureau of Reclamation
Secretary	Traci	Hopkins	H2scan
Member	Zan	Kiparizoski	Howard Industries
Guest-C	Peter	Kleine	E CIV USARMY CENWP (USA)
Member	Ryan	Musgrove	Oklahoma Gas and Electric
Member	Timothy C.	Raymond	EPRI
Chair	Sanjib	Som	PTT
Member	Brad	Staley	Leeward Energy
Member	Shankar	Subramany	KEMA, Netherland
Member	Pragnesh	Vyas	Sunbelt Solomon
Member	Kris	Zibert	ALLGEIER, MARTIN and ASSOCIATES, INC.

The chair asked for a volunteer to fill the Secretary role, Traci Hopkins (H2scan) volunteered, and was unanimously elected as secretary since this is the first ever in person meeting for this group.

As this was the first in-person meeting of the Task Force the chair reviewed the agenda and required IEEE policies. The Vice-chair distributed the sign-in sheet.

The chair then began review of the Title, Scope and Purpose of C57.140 **IEEE Guide for Evaluation and Reconditioning of Liquid Immersed Power Transformers.**

Discussion of the title and scope:

Scott Reed (MVA) – the current scope talks about reclamation, but there is very little in the guide on reclamation. We have C57.637. We may want to pare down the language to reflect what is actually covered in the guide. DGA – we have C57.104 so we don't need to overlap.

Luiz Cheim (Hitachi) – should we instead, ask our selves what we want from the guide. What is the need that is missing in the other guides and standards that are not covered.

Alan Sbravati (Hitachi) – there is an evaluation criteria to perform reconditioning - C57.166

Chair (Sanjib Som – PTT) – reminded attendees during the 1st meeting (virtual: 26 FEB 2024), there was an issue with the word "Evaluation" in the title

Luiz Cheim (Hitachi) – suggested "Evaluation" should be removed from title…this is maybe reconditioning.

There was mention of the C57.170 Guide and if we were duplicating what is in this guide. Discussion of this concern:

Chair – commented to the group the C57.170 is the assessment.

Brian Sparling (Kinectrics) - involved in previous revision of C57.140, also involved in C57.170 with Kumar Mani, also in CIGRE assessment guide. The purpose of C57.140 - how to identify candidates for replacement or renewal, not to give the criteria for reconditioning. Evaluation – what units deserve further evaluation. Purpose of 170. Before you touch it. #1 is it for refurbishment, replacement, whatever. Not how to bring it back to recondition. We have to define evaluation.

Tim Reymond (EPRI) – I took C57.170 and did a key word search for "Recondition." One section refers the reader to this document. When you identify a candidate, you have to evaluate if it's "worth" doing all this stuff on a transformer. Economic evaluation has a role. You can do all this stuff, but is there paper life left to be worth replacing bushings, replace oil, etc.?

Chair – we should not get into the cost in this document. IEEE scope is technical only, not cost.

Jinesh Malde (MIDEL) – why isn't retrofill included? A lot of the work done in retrofilling is used to extend the life of the transformer. Add retrofilling to the scope of the purpose.

UNKOWN – Retrofilling is mentioned in Annex

Ed teNyenhuis (Hitachi) – give the users tools to evaluate the transformers and it's up to the user to decide what they want to do based on cost or whatever. These are just evaluation tools for a user.

Vice-chair (Marcos Ferreira – Quanta Technology) – what I see that if a transformer is beyond repair then it should be replaced. This guide is to extend the life of the transformer. To do things that will extend the life of the transformer.

Joe White (Power Engineering) – if I am going to use this guide, what do I do first? Do I go here first or to C57.170 first?

Chair – our goal is to help the user use this to diagnose if they need to go to C57.170 next.

Brian Sparling (Kinetrics) – this is not a diagnostic tool. It's a report card that allows the user to understand the condition of the transformer. This is a piece by piece evaluation – like the condition of the tap changer, or the individual parts. This document helps user identify the grade "what is making it an F". C57.170 is to say "what is the grade" of the equipment.

Shuhen Xu (FMGlobal) – will this document also address when to replace a bushing (component) or the whole transformer?

Chair – yes, this is included.

Michael Saad (Hitachi) – do we have to list the piece of auxiliary equipment? Can we just say "auxiliary equipment" in the scope.

Brian Sparling (Kinetrics) – we need to add cooling system to the scope

Michael Saad (Hitachi) – I want to remove "such as bushings, DETC, LTC, etc" out and just have "auxiliary equipment"

Kumar Mani (Duke) – when you evaluate the xfmr component you may determine that it is the end of life of the transformer. This document will cover that. The goal of the guide is to "extend the life of the transformer" may not be true if the xfmr is determined to be at end of life.

Quamar Jutt (Kruger Products) – the goal of this guide is to assist the user to determine if they can extend the life of the transformer or not. Suggested adding the word determining to extend the life.

Brade Greaves (Weidman) – the goal of this guide is to assist in extending the life of the transformer. This can give you steps to extend the life, but it's up to the user to determine the end of life of the transformer. This guide just gives advice on how to extend the life of the transformer.

Shuhen Xu (FMGlobal) – deficiency management of the transformer. Like oil contamination that you need to fix.

Brian Sparling (Kinetrics) – condition assessment guide already covers that. To identify candidates for repair or replacement. Identify the candidates and their condition – like a report card. This is a deficiency management based on the condition guide. Xfmr condition only a good as the worst performing component. Purpose is to recommend what to do

Vice-chair – until we understand how C57.170 and C57.140 interact and compliment each other we need to review those two scopes and define those for the Task Force.

After much discussion on compare and contrast of C57.140 to C57.170 is was determined that Marcus Ferreira to do assessment of the two standards, John Sinclair – Black & Veatch will help.

Jeremiah Bradshaw (Bureau of Reclamation) – the fault tree info is in C57.170 and C57.140 and per Brian also covered in CIGRE, so this is a duplication.

Chair – pull up the C57.140 and the C57.170 and compare them to ensure we don't have scope overlap.

Luiz Cheim (Hitachi) – suppose there is a grey zone between the two, what is missing? What guidance for the user is waiting for us to put in this condition assessment?

There was a review of the Vancouver attendees who desired membership to the taskforce.

Chair - reviewed who requested membership and asked Traci to update member list.

Chair - will send out the C57.140 document and plans to organize a digital meeting before the in-person meeting in St. Louis to review input after everyone has a chance to compare the C57.140 document and the C57.170 document side by side and make comments on title, scope and purpose.

Discussion of Purpose Statement:

Shuhen Xu (FMGlobal) – asked what is definition of "Upgrading" in Purpose statement?

Luiz Cheim (Hitachi) – asked should we replace "upgrading" with "operating"

Vice-chair – accessories you upgrade, gave examples

Luiz Cheim (Hitchi) – then suggested "refurbish"

Vice-chair: "refurbish" to make suitable for service does not address upgrades.

Luiz Cheim (Hitachi) – need to provide definitions to following words in the Purpose: upgrading, reconditioning, refurbishing, etc.

Chair – brought up List of Contents: to contribute to Title, Scope, and Purpose

Vice-chair – confirmed we are here to review Title, Scope, and Purpose to go to PAR under Power Xfmr Group

Chair – referred to sections 4, 5, and 6 to drive what we are doing.

Jeremiah Bradshaw (Bureau of Reclamation) – asked does C57.152 include all Field Testing

Vice-chair: C57.152 confirmed yes does include field testing but is more geared towards commissioning of transformers.

Chair – added new members to achieve quorum. 20 members total with 11 present. We have Quorum.

Ed teNhyenuis (Hitachti) - Motion to accept the title "as is, no changes."

Tim Raymond (EPRI) - 2nd Motion on the title.

Discussion on the scope, no amendments to the title.

Kumar Mani (Duke) – suggested adding reactors to title

Alan Sbravati (Hitachi) – suggested "Evaluation of the viability of Reconditioning"

Jermiah Bradshaw (Bureau of Reclamation) – suggested removal of "and Reconditioning" from title. We already have C57.637 "Guide for Reclamation Insulating Liquids" Reconditioning is defined here and in C57.12.80 IEEE Terms & Definitions, specifically refers to the liquid insulation. the document overlaps with the C57.170

Jeffrey Wrght (Duquesne Light) – suggested title change to Liquid-Immersed Distribution Power Regulating Xfmrs

Jinesh Malde (MIDEL) – suggested change to refurbishing or reconditioning

Joe White (Power Engineering) – if we change Titel, Scope & Purpose will this change the schedule

Chair – No

Steven Small (B.C. Hydro) – suggested changing title to "IEEE Guide for Life Extension of Liquid-Immersed Transformers."

Then a bunch of discussion about the title of the document.

Jeremiah Bradshaw (Bureau of Reclamation) - Rehabilitation and Refurbishment not defined in IEEE

Derrick Hollrah (Burns & McDonnell) – suggested change Refurbishment to Life Extension

…"Guide for Evaluation and Life Extension of Liquid-Immersed Transformers."

Discussion on Rehabilitation and Refurbishment

Jeremiah Bradshaw (Bureau of Reclamation) - Rehab = non active parts; Refurbishment – active parts… refurbishment is scary , active part. Rehabilitation non-active part, bushings etc. Restoration should be the word that compromises both.

Vice-chair – restoration not accurate.

Restoration does not include upgrades

Eugenii Ermakov (Hitachi) – will we include load, etc for all life extension?

Chair – back to the motion – any discussion

Vote on Motion by Ed teNhyenuis for Title:

For:

Michael Saad

Timoth Raymond

Scott Reed

Ed teNhyenuis

Marcos Ferreira

Sanjib Som

Traci Hopkins

Against:

Kumar Mani

Jeremiah Bradshaw

Luiz Cheim

Emilio Morales Cruz

No abstentions.

End Result: IEEE Guide for Evaluation and Life Extension of Liquid Immersed Power Transformers.

Jeremiah Bradshaw (Bureau of Reclamation) – nope, not what we are looking for.

Meeting adjourned: 1634

After meeting adjourned:

Sanket Boler (Oncor) and Guang "Grace" Yuan (Hitachi) both requested membership.

Power Transformers Subcommittee
Working Group Report

Document #:	**C57.125**
Document Title:	**Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors**

Chair:	**Hakan Sahin**	**Vice-Chair**	**Thomas Melle**
Secretary	**Adam Sewell**	**Percent Complete**	**75%**

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

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

Meeting Date: **11 March 2024** **Time:** **4:45pm – 6:00pm**

Location: **Vancouver, BC, CAN**

Attendance:	**Members**	**21 of 40**
	Guests	**49**
	Guests Requesting Membership	**22**
	Total*	**92**

*** 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, March 11, 2024 at Hyatt Regency Vancouver; Vancouver, British Columbia, Canada.

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. 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. 40 members and 21 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 for Spring 2024
   ii. Approval of the Fall 2023 unapproved meeting minutes
   iii. Motion to approve as shown – H.Flores, 2nd – B.Forsyth
      1. No objection to unanimous approval – ALL APPROVED

2. Old Business
   a. Review the changes proposed for Section 4.2 Investigation flow chart
      i. Chair will send out proposed changes for the Fig-1 flowchart under clause 4.2 for WG electronic vote after the S24 meeting.
      ii. MOTION made by B.Forsyth - upon approval/rejection of the revised flowchart for section 4.2 the document with all approved changes shall proceed to sponsor ballot.
         1. During discussions, a call to vote was made – B.Forsyth/W.Binder
            a. 14/21 members approved the call to vote
         2. Vote was 20 YES, 1 ABSTAIN – MOTION PASSES
   b. Definition for compressive force
      i. MOTION made by A.Sarkar, 2nd – M.Saad to use definition from C57.164
         1. Vote was unanimously approved with 1 abstention
   c. Review and revision of the old businesses will be completed offline, and the revisions will be sent to WG members via email for voting and continue to work offline until WG member agreement to revise, or not to revise, is achieved.
   d. Once the above incomplete old businesses are approved by WG members - by electronic voting and comments resolved, Document revision starts.
   e. The document will be revised with all agreed changes, emailed to WG members before the next meeting for voting and to receive all comments
   f. These comments will be reviewed and answered before and during the next meeting if necessary.
   g. The goal is to be able to get the WG approval of the revised document during the Fall_24 meeting.
   3.

3. New Business
   a. Chair will send out Fig-1, clause 4.2 flowchart proposed changes via email for vote and will prepare the draft document and email out to all members for review.

4. Membership changes
   a. Officers will look at attendance of members and member requests to make changes to WG membership list before the Fall 2024 meeting.

5. Next meeting: October 28, 2024 at the Fall 2024 Transformers Committee Meeting scheduled for October 27-31, 2024, St. Louis, MO, USA.

6. Close of meeting

a. Meeting adjourned at 6:00pm

Submitted by: Hakan Sahin Date: 3/30/24

March 11, 2024 Meeting Attendance (RM = Request Membership):

Last Name	First Name	Company (Affiliation)	Role
Adams	Kayland	Prolec GE Waukesha	Guest
Alonso	Mario	Georgia Transformer	Guest
Bargone	Gilles	FISO Technologies Inc.	Guest-RM1
Betancourt	Enrique	Prolec GE	Member
Binder	Wallace	WBBinder Consultant	Member
Boettger	William	Boettger Transformer Consulting LLC	Member
Bolar	Sanket	Oncor	Member
Bray	Elisabeth	Southern Company	Guest
Chambers	Stuart	EPRI	Member
Debass	Samson	EPRI	Guest-RM2
Dillon	Nikolaus	Dominion Energy	Member
Draper	Zachary	Delta-X Research	Guest-RM3
Dulac	Hakim	Advanced Power Technologies	Guest-RM2
Faur	Florin	Prolec GE Waukesha	Member
Flores	Hugo	Hitachi Energy	Guest-RM3
Forsyth	Bruce	Bruce Forsyth and Associates PLLC	Member
Garcia Wild	Eduardo	Siemens Energy	Member
Gorzin	Alireza	Black & Veatch	Guest-RM1
Guner	Ismail	Hydro-Quebec	Guest
Hampton	Kevin	Siemens Energy	Guest
Hernandez-Mejia	Jean Carlos	Georgia Tech	Guest
Hogg	Ryan	Bureau of Reclamation	Guest
Hollrah	Derek	Burns & McDonnell	Guest
Jarosz	Patrycia	IEEE	Guest
Johnson	Christopher	Oncor	Guest-RM1
Kazmierczak	Jerzy	Hitachi Energy	Guest
Kessler	Stacey	Ulteig Engineers	Guest-RM3
Klempner	Duritriy	Southern California Edison	Guest
Knapp	Evan	EATON Corporation	Guest
Koshel	Anton	Delta Star Inc	Guest
Loiselle	Luc	Tetra Tech	Guest
Lucas, P.E.	Tiffany	Prolec GE Waukesha	Guest
Machain	Jose Luis	Prolec GE	Guest-RM1
Melle	Tom	Highvolt	Member-ViceChair
Mills	Francis	Power Engineers	Guest-RM2
Montanha	Juliano	Siemens Energy	Guest-RM2
Morales-Cruz	Emilio	Qualitrol	Member
Munoz	Marta	Hitachi Energy	Guest
Musgrove	Ryan	Oklahoma Gas & Electric	Member
O'Malley	Anastasia	Consolidated Edison Co. of NY	Member
Orozco	Polo	GE Grid Solutions	Guest
Panesar	Parminder	Virginia Transformer Corp.	Member
Raymond	Timothy	EPRI	Guest-RM3
Reyes Perez	Juan	Hitachi Energy	Guest
Rocque	Timothy	Prolec GE Waukesha	Guest
Saad	Mickel	Hitachi Energy	Member

Last Name	First Name	Company (Affiliation)	Role
Sahin	Hakan	Virginia Transformer Corp.	Member-Chair
Sarkar	Amitabh	Virginia Transformer Corp.	Member
Schleismann	Eric	Southern Compnay	Guest
Schrammel	Alfons	Siemens Energy	Guest
Selvaraj	Pugal	Virginia Transformer Corp.	Member
Sewell	Adam	Quality Switch, Inc.	Member-Secretary
Solano	William	Maschinenfabrik Reinhausen	Guest-RM1
Som	Sanjib	Pennsylvania Transformer	Guest-RM3
Steele	Hampton	TVA	Guest
Subramany	Shankar	KEMA Netherlands	Guest-RM1
Tanaka	Troy	Burns & McDonnell	Member
Thompson	Ryan	Burns & McDonnell	Guest
Waldrop	Mike	Memphis Light, Gas & Water	Guest
Wallach	David	Duke Energy	Guest
Weisensee	Matthew	PacifiCorp	Guest
Weyer	Daniel	Monolith	Guest-RM1
Whitten	Christopher	Hitachi Energy	Guest
Yun	Joshua	Virginia Transformer Corp.	Member
Davoudi	Pouneh	Delta Star Inc	Guest
Rezran	Arash	Delta Star Inc	Guest
Himaw	Martin	Highvolt	Guest-RM1
Kim	Yeounsoo	MEPPI	Guest-RM1
Hamoir	Didier	Transformer Protector Grp	Guest
Hermann	Florian	Trench France	Guest
Elson	Eric	SDGE	Guest
Pedro	Pedro	EFFACEC Energia	Guest
Watson	Joshua	Nebraska Public Power District	Guest
Frazier	Raymond	Ameren	Guest
Bender	Jonathan	W.E. Gundy & Associates	Guest
Mbouombouo	Mama	Hitachi Energy	Guest-RM1
Lewis	Samuel	Hitachi Energy	Guest
Lembacher	Stefon	Siemens Energy	Guest
Murowinski	Emma	Delta-X Research	Guest-RM1
McCarrick	Brian	Virginia Transformer Corp.	Guest
Vyas	Pragnesh	Sunbelt Solomon	Guest-RM1
Lamontagne	Donald	Ariz Public Svc	Guest
Jeong	Chanmin	HD Hyundai	Guest
Tan	Jonathan	Northern Transformer	Guest-RM1
Gagnon	Jean Philippe	Qualitrol	Guest
Patel	Monil	PG&E	Guest
Baser	Levent	Hitachi Energy	Guest
Zhang	Gigi	Hico-America	Guest
Greaves	Brad	Weidmann Electrical Technology	Guest
Hrkac	Miljenko	Hitachi Energy	Guest
Yang	Fei	Hitachi Energy	Guest
Salem	Sherif	Eversoource Energy	Guest

Power Transformers Subcommittee
Working Group Report

Document #:	**C57.157**
Document Title:	**Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid-Immersed Transformers**

Chair:	**Adam M. Sewell**	**Vice-Chair**	**N/A**
Secretary	**Piotr Blaszczyk**	**Percent Complete**	**N/A**

Current Draft Being Worked On: **N/A** **Dated:** **N/A**

PAR expires 12/31/2027

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

Meeting Date: **12 March 2024** **Time:** **8:00am-9:15am**

Location: **Vancouver, BC, CAN**

4.	**Attendance:**	**5.** **Members**	**10 of 15**
6.		**7.** **Guests**	**27**
8.		**9.** **Guests Requesting Membership**	**5**
10.		**11.** **Total***	**42**

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

Meeting Minutes / Significant Issues / Comments:

7. Meeting was called to order at 8:00am, March 12, 2024 at Hyatt Regency Vancouver; Vancouver, British Columbia, Canada - Balmoral room (3rd Floor).
8. Presentation of Agenda
9. 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
10. 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
11. Checking the Quorum – 15 members so 8 needed for quorum.
    a. 10 out of 15 members were in attendance of the meeting so quorum was achieved.
12. Approval of the Meeting Minutes from Fall 2023 and Spring 2024 Agenda.

a. Motion was made by D. Schwartz and seconded by F.Faur to approve Fall 2023 Meeting Minutes and Spring 2024 Agenda.
b. No opposition to unanimous approval of the motion - APPROVED

13. 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.
14. 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
        ii. Chair presented background information on this guide during the meeting by showing one of the presentations that is available on IEEE Collabratec.
    b. Members of this group were tasked to review current guide standard and previous presentations before Spring 2024 meeting and make suggestions as to what recommendations they have for this guide standard
    c. Presentation was made by F. Faur of his observations of the current guide:

Summary

The purpose of the test described in C57.157 is to verify if the contacts of a tap changer would perform adequately over 30 years of its life.

The test makes the simplification hypothesis that the contact life depends on the thermal runaway due to the increased resistance of the contact points. The main conclusion after this test is that Ag-Ag contacts perform better than any other combination, and Sn plated contacts perform the worst.

While this is true, it is not the only practical option to mitigate the problem of overheating, and not the only cause of overheating. Also, the number of other causes that can trigger a contact failure is so high, that performing the test in every condition is impractical. Having passed the test in one configuration doesn't guarantee that the same contact or even switch will pass the test in another configuration.

Comments

(in the comments below, when I mention contact, I am referring to the entire body of a stationary or a moving contact, as opposed to the contact point as the sum of A-spots between 2 contacts)

1. Trapped hot oil
   Sometimes, either the tap changer manufacturer or the transformer manufacturer adds extra barriers to increase dielectric strength. In this case, the hot oil created by the contact would keep overheating, accelerating the contact failure.

2. Different coefficient of thermal expansion
   A long moving contact that operates close to its thermal capabilities, would thermally expand differently than the insulating material that separates the stationary contacts. That makes the contact points move slightly every time the temperature changes. Each time the contact moves, it breaks new areas of oxidation that accumulate around the contact points, increasing the electrical resistance and preventing oil cooling. The longer the contacts, the more predominant is this phenomenon.

3. Number of cycles
   The test exclusively assesses the deleterious effects of the contacts' prolonged exposure to high temperatures, disregarding the cycle count in a heavy-duty switch application. In some of the documentation from the time the test was developed, it was *observed that most failures were in peaking, pulsing loads: Rectifier Loads, Motor Starting Loads, Furnace Supplies, or Emergency Generator Transformers*. No failures were observed *in utility transformers or units that had more "homogenized" loads*. That means that an increased number of cycles might be more important than the current, temperature, and time itself.

4. Operating the tap changer
   If a contact point is Ag-Cu, then, by operating it several times, part of the silver from AG contacts is smeared over the blank Cu contact. For this reason, pure Ag-Cu contacts don't exist.

5. Oil properties
   Transformer oil can have different properties that affect contact cooling, gas generation, coke formation, etc. The transformer manufacturer decides what oil to use. I am not referring to structural differences like mineral vs. ester vs. silicone oils. I am referring to subtle differences like additives in the oil, inhibited vs. non-inhibited oil, etc. All those small changes may, among other things, affect oil thermal breakdown and the formation of film deposits and increase contact point resistance.

6. Spring force
   Sometimes the springs in the contacts lose their compression force in a longer time than the 30 days of testing, leading to contact failure. The test would pass a contact that would fail in the real world with the same symptoms.

7. Insufficient contact section
   The heat generated by the contact point itself couldn't be eliminated properly. Sometimes, just increasing the cross-section of the contact could solve the heat problem.

8. Cable & Cable lug heat sink
   The section of the cables and cable lugs and the insulation over the cable affect the elimination of heat from the contacts, or they can even contribute to heating the contacts.

9. Water, gases, and contaminants
   The test doesn't address the possible presence of water or gases in oil and their effect on the oxidation and aging of the oil. Those can affect the behavior of contacts at elevated temperatures more than the temperature itself.

10. Oxygen concentration
    The oil behaves differently if the tank is sealed, has a nitrogen blanket, has a conservator, or is free breathing.

From the above observation, I think that this test has a similar kind of performance prediction ability to the standard temperature rise test from C57.131, but using more harsh conditions (longer test and higher temperature).

Slightly related to the above, in the standard C57.131 I think that it would be beneficial if we could add some comments about the testing conditions: the amount of oil, distance to the walls and oil surface, the length of cables in the oil, the thermal insulation of the tank, dielectric barriers, etc.

15. 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 in Kansas City Fall 2023 meeting.
    i. Chair has requested a presenter/presentation to give at a future meeting from a synthetic ester producer. No presentation was ready for Vancouver meeting so plan on having a presenter/presentation for Fall 2024 St. Louis meeting.

16. Next meeting: October 29, 2024 at Fall 2024 Transformers Committee Meeting scheduled for October 27-31, St. Louis, MO, USA.
17. Close of meeting
    a. Meeting adjourned at 8:50am

Submitted by: Adam Sewell Date: March 24, 2024

Meeting Attendance March 12, 2024 (RM = Request Membership):

Last Name	First Name	Company (Affiliation)	Role
Ali	Rehan	Siemens Energy	Guest
Blaszczyk	Piotr	Specialty Transformer Components LLC	Secretary
Boman	Paul	HSBI&I Co.	Guest
Brodeur	Samuel	Hitachi Energy	Guest
Colopy	Craig	Retired from EATON	Guest
Cruz Valdes	Juan Carlos	Prolec GE	Member
Dutta Roy	Samragni	Siemens Energy	Member
Faur	Florin	Prolec GE Waukesha	Member
Flores	Hugo	Hitachi Energy	Guest
Gamboa	Jose	H-J Family of Companies	Guest
Gara	Lorne	SHERMCO	Guest
Garza	Hector	Orto de Mexico	Guest
Greaves	Brad	Weidmann	Guest
Griesacker	Bill	Duquesne Light Co.	Guest
Hamoir	Didier	Transformer Protector Corp	Guest
Harley	Jack	First Power Group LLC	Guest
Jacob	Nathan	Cemlin Energy	Guest
Johnson	Christopher	Oncor	Guest
Kapka	Sergiusz	Hitachi Energy	Guest
Leigl	Angela	EATON	Guest
Lopez-Fernandez	Xose	Universidade de VIGO	Guest
Machain	Jose Luis	Prolec GE	Guest
McCarrick	Brian	VCT	Guest
Munoz Molina	Martin	Orto de Mexico	Guest-RM1
Musgrove	Ryan	Oklahoma Gas + Electric	Guest
Newbill	Mark	Hitachi Energy	Guest-RM1
Nims	Joe	Allen & Hoshall	Guest
Pruente	John	Prolec GE Waukesha	Guest-RM1
Raymond	Timothy	Electric Power Research Institute (EPRI)	Guest
Rehkopf	Sebastian	Maschinenfabrik Reinhausen	Member
Reimer	Jonathan	Foryis BC	Guest
Saad	Mickel	Hitachi Energy	Guest
Schwartz	Dan	Quality Switch, Inc.	Member
Sewell	Adam	Quality Switch, Inc.	Chair
Sewell	Jeremy	Quality Switch, Inc.	Member
Sewell	Russ	Quality Switch, Inc.	Guest
Smith	Jimmy	Howard Ind	Guest-RM1
Solano	William	Maschinenfabrik Reinhausen	Member
Tillery	Timothy	Howard Industries	Member
Vary	Robert	Reinhausen US	Guest
Vierelk	Karsten	Reinhausen	Guest
Whitten	Christopher	Hitachi Energy	Guest-RM1

Attachment K.4.11

IEEE TC MEETING Minutes

Working Group PC57.170

Condition Assessment Guide

March 12, 2024

9:30 AM – 10:45 AM (PST)

Hyatt Regency, Vancouver, BC Canada Conference Room: Regency C/D

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

1. Call to Order
    a. Chair's Remarks
    b. IEEE-SA Policies, including Essential Patent Policy Reviewed
    c. Copyright Policy Reviewed
    d. Quorum was established 33 of 54 members were present. There was a total of 116 attendees. Noted that Dharam Vir is to be added to the members list.

2. Spring 2024 Meeting Agenda Review and Approval. Reviewed and approved without any objections or abstentions.
    a. Moved by, Dharam Vir
    b. Second, Marcos Ferreira

3. Approval of Fall 2023 Meeting Minutes of the Previous meeting, No objections, or abstentions.
    a. Moved by, Amitabh Sarkar
    b. Second by, Rogerio Verdolin

4. PC57.170 Guide Progress
    a. Saranna Hoffman reported on the straw ballot results, 27 in total, 18, technical, and 9 editorial. There were 4 unresolved, as there was no suggested alternative to the objection made. Draft 12 emailed out to the working group members includes all revisions made based on the straw ballot comments.
    b. Stephanie Mabry reported good progress on editing and formatting, and suggested it was ready to go to the Power Transformers SC to move to formal ballot stage and then MEC.
    c. A motion to move the approved Draft 12 to formal ballot.
    d. Moved by, Hemchandra Shertukde
    e. Second by, Hakim Dulac
    f. 32 approved with no objections and no abstentions.

g. Motion passed, and Chairman will carry forward the WG recommendation to move the Draft 12 after final editing to MEC/ballot.

5. List of Volunteers for SA Ballot comment resolution group, as taken at the WG meeting Tuesday March 12th 2024:
    a. Sankett Bolar Sanket.Bolar@oncor.com
    b. Ryan Musgrove
    c. Joe White
    d. Mark Tostrud
    e. Saramma Hoffman
    f. Deanna Woods
    g. John Sinclair
    h. Chris Johnson Christopher.Johnson@oncor.com
    i. Brian Sparling
6. Presentation by Brian Sparling on Steps to Build a Condition Assessment Indices. PDF of PowerPoint file to be uploaded to the web site.
7. Roger Verdolin, Joshua Yun and Timothy Raymond requested Membership.
8. Next meeting is in St Louis, MO between Oct 27-31, 2024.
9. Meeting Adjourned.

Attendee List:

First Name	Last Name	Member Y/N	Affiliation
Mario	Alonso		Georgia Transformers
Giles	Bargone		FISO
Barry	Beaster		H-J Group of Companies
Jason	Beaudoin		Weidmann
Jean Noel	Berube		Rugged Monitoring
Enrique	Betancourt	Y	GE Prolec
Jeremy	Bradshaw		Bureau of Reclamation
John	Brett		Delta-X Research
William	Boettger	Y	Boettger Transformer Consulting LLC
Sanket	Bolar		Oncor
Paul	Bowman		Hartford Steam Boiler
Samuel	Brodeur		Hitachi Energy
Piotr	Blaszczyk		Specialty Transformers
Mark	Cheatham		GE Vernova
Matt	Chu		Shihlin Electric
Randy	Cox		GE Vernova
Alexander	Crown		Coil Innovation
Marcos	Czernorucki		Hitachi Energy
Luiz	Cheim	Y	Hitachi Energy
Hakim	Dulac	Y	APT Technologies
Lee	Doyle		Vaisala
Zack	Draper	Y	Delta X Research
Jesse	Duffy		Nespower
Evgenii	Ermakov	Y	Hitachi Energy
Zlatan	Fazlic		Camlin Power
Todd	Felton		MVA Diagnostics
Miguel	Fernandez		Braintree Electric Light Dept
Mark	Foata		MR Germany
Bruce	Forsyth		Cargill
Marco	Espindola	Y	Hitachi Energy
Marcos	Ferreira	Y	Quanta Technology
Jean Philippe	Gagnon		Qualitrol Inc
Eduardo	Garcia		Siemens Transformers Mexico
James	Gardner		Prolec GE
Brad	Greavas		Weidmann
Ismail	Guner	Y	Hydro One
Atila	Gyore	Y	M&I Materials Ltd

Didier	Hamoir		Transformer Protector Corp
Kevin	Hampton		Siemens Energy
Saramma	Hoffman	Y	PPL
Jean	Hernandez		Neetrac GA Tech
Traci	Hopkins		H2 Scan
Natan	Jakob		Camlin Energy
Christopher	Johnson		Oncor
Ryan	Jonak		PG&E
Patrycja	Jarosz		IEEE SA
Jerzy	Kazmierczak		Hitachi Energy
Sheldon	Kennedy		Sheldo P Kennedy Engineering
Dmitriy	Klempner		Southern California Edison
Rafal	Kowalski		Hitachi Energy
Stacey	Kessler		Ulteic Engineering
Donald	Lamontague		Arizona Public Service
Weijun	Li	Y	Beld
Cesar	Lizcano		Shell USA Inc
Ricardo	Lopez		Efacec Transformers
Tiffany	Lucas		Prolec GE
Stephanie	Mabrey	Y	Weidmann
Jinesh	Malde		MI Materials
Kumar	Mani	Chair	Duke Energy
Tony	Mellin		Vaisala
Emilio	Morales-Cruz	Y	Qualitrol Corp
Emma	Murowinski		Delta-X Research
Ryan	Musgrove		Oklahoma Gas & Electric
Joe	Nims		Allen & Hoshall, Inc.
David	Olan		BC Hydro
Anastasia	O'Malley		Con Edison NY
Eduardo	Crozco		GE Vernova
Parminder	Panesar		Virginia Transformer Corp
Pedro	Pedro		Efacec Transformers
Nick	Pervanik		AVO Diagnostic Services
John	Pruente		Prolec GE Waukesha
Ulf	Radbrandt		Hitachi Energy
Tim	Raymond	Y	EPRI
Scott	Reed	Y	MVA Diagnostics
Perry	Reeder		GE Prolec
Michael	Richardson		Ameren
Diego	Robalino		Megger

Mickel	Saad	Y	Hitachi Energy
Amitabh	Sarkar	Y	Virginia Transformer Corp
Alan	Sbravati	Y	Hitachi Energy
Aron	Sexton		Kinectrics
Hemchandra	Shertukde	Y	Univ. of Hartford
Michal	Sinatkowski		Hitachi Energy
Jonathan	Sinclair	Y	Black & Veatch
Yang Tac	Sohn		Hyosung HICO
Mauricio	Soto	Y	Hitachi Energy
Steven	Small		BC Hydro
Brian	Sparling	Y	Kinectrics
Brad	Staley	Y	Leeward Renewable Energy
Charles	Sweetser	Y	Omricon Energy
Mathew	Sze		Omricon Energy
Marko	Teofanovic		Ontario Power Generation
Roger	Ting		Shihlin Electric
Mark	Tostrud	Y	Dynamic Ratings
Alwyn	Vanderwalt		ECI
Robert	Vary		Reinhausen USA
Rogerio	Verdolin	Y	Verdolin Solutions Inc.
Karten	Vierelk		MR Germany
Dharam	Vir	Y	GE Prolec
Patrick	Yan		GE Grid
Asam	Yu		Shihlin Electric
Joshua	Yun	Y	Virginia Transformer Corp.
Alan	Washburn	Y	Burns & Macdonald
Matthew	Webb		Prolec GE
Drew	Welton		Intellirent
Daniel	Weyer		Monolith
Joe	White		Power Engineers
Trenton	Williams		APT Technologies
Stefan	Wirth		Coil Innovation
Deanna	Woods		Alliant Energy
Jeffrey	Wright	Y	Duqlight Power
Shuzhen	Xu		FM Global
Guang	Yuan		Hitachi Energy
Joshua	Yun		Virginia Transformer Corp
Peter	Zhao	Y	Hydro One

Attachment K.4.13

Working Group Meeting for IEEE Standard PC57.17

K.8.1 Vancouver, BC Meeting – March 12, 2024 11:00-12:15 pm PDT

Chair: Dom Corsi
Secretary: Jason Varnell

1. The meeting was called to order at 11:00 AM PDT.
2. There were 25 active participants present, which consisted of 13 of the 20 members. Quorum was achieved.
3. Three (3) participants requested membership; however, only one (1) was granted membership due to attendance. With the new member, the new membership total is 21 members.
4. The chair reviewed the IEEE patent slides and the group made no patent claims.
5. The chair reviewed the copyright policy with the group.
6. The PAR details were reviewed with the Working Group:
    a. PAR Approval: June 5, 2023
    b. PAR Expiration: December 31, 2027
    c. Expected Date of submission of draft to the IEEE SA for Initial Standards Association Ballot: December 2026
    d. Projected Completion Date for Submittal to RevCom: April 2027
7. A motion was made by Sanjib Som (Pennsylvania Transformer) and seconded by Dan Sauer (Eaton Corp.) to approve the Spring 2024 meeting agenda. There were no objections to unanimous approval of the agenda. A motion was made by Dan Sauer (Eaton Corporation) and seconded by Sanjib Som (Pennsylvania Transformer) to approve the Fall 2023 Kansas City Working group meeting minutes. There were no objections to unanimous approval of the Fall 2023 Kansas City working group meeting minutes.

8. **Old Business:** The chair announced that the current working draft (D1) was uploaded to the IEEE Transformers Committee website in MS WORD format on March 10, 2024.
9. **Old Business:** The volunteers who previously agreed to take lead on incorporating changes to subclauses were reviewed with the working group. New volunteers are as noted below.
    a. Clause 4: Ratings section – Previous Volunteers: Dan Sauer (Eaton Corporation) and Jason Beaudoin (Weidmann). **New Volunteer: Sheldon Kennedy (Consultant).**
    b. Clause 7: Connections section – Previous Volunteers: Sanjib Som (Pennsylvania Transformer), Emilio Morales (Qualitrol) and Thrinadha Katapalli (Virginia Transformers).
    c. Clause 8: Testing section – Previous Volunteers: Dom Corsi (Doble Engineering) and Jason Varnell (Doble Engineering).
    d. Clause 9: Construction section – Previous Volunteers: Sanjib Som (Pennsylvania Transformer).
    e. Annex A – DC Arc Furnace section – Previous Volunteers: Dan Sauer (Eaton Corporation) and Jerzy Kazmierczak (Hitachi Energy).
    f. Annex B – IEEE Guide for Arc-Furnace Protection section – Unassigned.
    g. Annex C – Replacement and Remanufacturing of Low Voltage Bus Bars – Previous Volunteers: Jason Beaudoin (Weidmann) and Jason Varnell (Doble Engineering).
    h. Annex D – Bid Document Checklist section - Unassigned.
    i. Annex E - New Section on High Temperature Insulation Application (including Fiber Optics)– Previous Volunteers: Gilles Bargone (FISO) and Emilio Morales (Qualitrol).
10. **New Business:** The chair reviewed the wording in subclause 8.7 for thermal duplicate and the working group discussed the differences between the wording compared to the C57.12.00-2021 Subclause 8.5. Trenton Williams (Advanced Power Technologies) made a motion to replace the wording from Subclause 8.7 with the exact wording from C57.12.00-2021 Subclause 8.7. The motion was seconded by Sanjib Som (Pennsylvania Transformer) and passed with unanimous consent.
11. **New Business:** Sanjib Som (Pennsylvania Transformer) discussed the importance of the temperature rise test for transformers covered under this standard, citing that the transformers are very unique, difficult to replace, and often operate at full load. Sanjib Som made a motion to revise Subclause 8.1 to state that the temperature rise test be a routine type test for transformers within the scope of this standard. The motion was seconded by Emilio Morales (Qualitrol). The motion passed with five (5) votes in favor, one (1) against, and five (5) abstention votes. The chair did not cast a vote. Jason Varnell (Doble Engineering) agreed to draft the wording to incorporate the temperature rise test as a routine test in Subclause 8.1 and to provide additional details regarding the requirements in Subclause 8.7.
12. **New Business:** There was discussion on whether impulse tests, applied potential test, and induced voltage tests were considered routine tests since they were not directly stated to be in Subclause 8.1 (Routine tests). Upon review of Subclause 8.8 (Dielectric tests), the tests were stated to be required; therefore, the working group agreed that 8.1 should be revised to state that the dielectric tests were routine. Jason Varnell (Doble Engineering) agreed to incorporate the changes into draft D1.1.
13. **New Business:** Trenton Williams (Advanced Power Technologies) made a motion to submit draft D1.1 to the working group, which will include any updates as discussed during the S24 WG meeting,

for straw ballot. The straw ballot should be completed prior to the Fall 2024 working group meeting. The motion was seconded by Ryan Musgrove (OG&E). The motion passed with unanimous consent.

14. **New Business:** There was discussion on informative Annex C. Subclause C.1 was reviewed and as it stated, the annex was a direct duplication of ANSI C57.17-1965; therefore, the working group agreed to reduplicate the text and that there will be no major effort in reviewing the annex.
15. The next working group meeting will be in St. Louis, Missouri, USA during the Fall 2024 Transformers Committee Meeting.
16. The meeting adjourned at 12:00 PDT.

Attendance Record:

Status as of 3/12/2024 (After S24 Meeting)	Last Name	First Name	Affiliation
Member	BARGONE	GILLES	FISO
Member	BEAUDOIN	JASON	WEIDMANN
Member	BOETTGER	WILLIAM	BOETTGER TRANSFOMER CONSULTING LLC
Guest	CZERNORUCKI	MARCOS	HITACHI ENERGY
Guest	FAUR	FLORIN	PROLEC-GE WAUKESHA
Guest	FOLDI	JOESPH	F&A INC.
Guest	GAGNON	JEAN PHILIPPE	QUALITROL
Guest	GORZIN	ALIREZA	BLACK & VEATCH
Member	KAZMIERCZAK	JERZY	HITACHI ENERGY
Member	KENNEDY	SHELDON	SHELDON KENNEDY ENGINEERING PLLC
Guest	KIM	YEOUNSOO	MEPPI
Guest	KOWALSKI	RAFAL	HITACHI ENERGY
Guest	LEWIS	SAMUEL	HITACHI ENERGY
Guest	MENDEZ	OMAR	PROLEC-GE
Member	MORALES-CRUZ	EMILIO	QUALITROL
Member	MUSGROVE	RYAN	OG&E
Member	NEWBILL	MARK	HITACHI ENERGY
Member	SAUER	DAN	EATON
Member	SOM	SANJIB	PTTI
Guest	STANK	MARKUS	MR
Secretary	VARNELL	JASON	Doble Engineering Co.
Guest	VERDOLIN	ROGERIO	VERDOLIN SOLUTIONS

Attachment K.4.15

TF/Study Group – 60076-57-1202

Chair: Ewald Schweiger

60076-57-1202

Liquid immersed Phase-Shifting Transformers

IEC/IEEE – PST Standard

1. Meeting took place at 1:45 PM (PDT) on Tuesday March 12th.
2. This was the first in-person meeting as Study Group – A virtual meeting took place on January 23rd, 2024.
   Here in Vancouver 37 attended our first in-person the meeting.
3. The objective of our Study Group is to provide the Power Transformers Subcommittee (PTSC) with a recommendation whether the document needs revision.
4. Call for patents & Copyright statement
   c) The slides on essential patents from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.
   → No essential patents or issues were reported.
   d) The slides on IEEE copyright policy from IEEE have been uploaded on the internet and were presented during the meeting. A call for essential patents was made.
   → No issues were reported.
5. Establish quorum
   - A quorum was achieved since this was the first in-person meeting.
6. Approval of agenda
   c) No comments from the group
   d) The agenda was unanimously approved (motion by Kevin Juchem and seconded by Luc Dorpmanns)
7. Approval of meeting minutes of the previous virtual meeting on January 23rd, 2024
   c) No comments from the group
   d) The meeting minutes were unanimously approved (motion by Kevin Juchem and seconded by Joe Watson)
8. Discussion based on feedback from review of IEC/IEEE 60076-57-1202 2016 and next steps
   a. Feedback was collected about the requirements for revisions (like Errors, clarifications, improvements, updates, etc.).
   e) Christoph Ploetner as head of IEC TC14 shared with the group that he is in favor of revising the PST Guide (C57.135 – 60076-57-135) in parallel with the PST Standard (60076-57-1202).
   f) Karsten Viereck proposed to include new methods in the revision, like for clause 6 (control) about paralleling to compare the phase angle instead of tap position synchronizing (like stated in the current version).
   g) The feedback and the discussions indicated clearly that a revision of the current document is needed.

9. Joe Watson made a motion to recommend to the PTSC to revise 60076-57-1202. Williams Trenton provided a second.
    - Motion carried unanimously with no objections or abstentions.
10. After the motion passed, the Study Group started to work on the Title and Scope.
11. Joe Watson made a motion to propose the title and scope as follows:

    Title:

    Part 57-1202: Liquid immersed phase-shifting transformers

    Scope:

    This document specifies requirements of liquid immersed phase-shifting transformers of all types.

    The scope excludes transformers with an unregulated phase shift. This document is limited to matters particular to phase-shifting transformers and does not include matters relating to general requirements for power transformers covered in existing standards in the IEC 60076 series or IEEE Std C57.12.00™ and IEEE Std C57.12.10™.

    For the sake of clarity:

    The first sentence of the original scope was changed:

    Deleted: This part of IEC 60076 covers the requirements for phase-shifting transformers of all types.

    Added: This document specifies requirements of liquid immersed phase-shifting transformers of all types.
12. Luc Dorpmanns seconded the motion by Joe Watson.
    - Motion carried unanimously with no objections or abstentions.
13. Therefore, we will seek approval from the PTSC on Wednesday, March 13th, 2024 to request a PAR to revise 60076-35-1202.
14. The meeting was adjourned at 2:45 PM (PDT)
15. Next meetings (planned):

    Virtual meeting – to be scheduled before October 2024 in St Louis, MO

    In-person meeting – October 28 or 29, 2024 in St Louis, MO

Respectfully submitted,
Ewald Schweiger - Study Group Chair

List of attendees for this meeting:

Name	Last name	Given name	Affiliation
Sean Barker	Barker	Sean	Hitachi Energy
Jason Beaudoin	Beaudoin	Jason	Weidmann
Jean-Noel Berube	Berube	Jean-Noel	Rugged Monitoring Quebec Inc
Oscar Castanon Barragan	Castanon Barragan	Oscar	Siemens Energy
Vivian Chan	Chan	Vivian	Hitachi Energy
Craig Colopy	Colopy	Craig	Retired from EATON
Marcos Czernorucki	Czernorucki	Marcos	Hitachi Energy
Bryan Deb	Deb	Bryan	Siemens Energy
Luc Dorpmanns	Dorpmanns	Luc	Royal SMIT Transformers
Eric Elson	Elson	Eric	San Diego Gas and Electric

Ken Fedor	Fedor	Ken	SGB-Smit Group
Patrick Foster	Foster	Patrick	NextEra Energy
Jean-Philippe Gagnon	Gagnon	Jean-Philippe	Qualitrol
Kevin Hampton	Hampton	Kevin	Siemens Energy
Kevin Juchem	Juchem	Kevin	Hitachi Energy
Stefan Lembacher	Lembacher	Stefan	Siemens Energy
Aleksandr Levin	Levin	Aleksandr	Weidmann Electrical Technology
Ricardo Lopes	Lopes	Ricardo	EFACEC Transformers
Omar Mendez Zamora	Mendez Zamora	Omar	PROLEC GE
Ryan Musgrove	Musgrove	Ryan	OG&E
David Olan	Olan	David	BC Hydro
Mirna Olic	Olic	Mirna	Koncar Power Transformers LTD
Christoph Ploetner	Ploetner	Christoph	Siemens Energy
Sebastian Rehkopf	Rehkopf	Sebastian	Maschinenfabrik Reinhausen
Alfons Schrammel	Schrammel	Alfons	Siemens Energy
Ewald Schweiger	Schweiger	Ewald	Siemens Energy
Michael Shannon	Shannon	Michael	Rea Magnet Wire
Steven Small	Small	Steven	BC Hydro
Markus Stank	Stank	Markus	Maschinenfabrik Reinhausen
Shankar Subramany	Subramany	Shankar	KEMA Labs
Robert Vary	Vary	Robert	Reinhausen Manufacturing Inc.
Karsten Viereck	Viereck	Karsten	Maschinenfabrik Reinhausen
Joe Watson	Watson	Joe	JD Watson and Associates Inc.
Matthew Weisensee	Weisensee	Matthew	PacifiCorp
Trenton Williams	Williams	Trenton	Advanced Power Technologies
Rene Wind	Wind	Rene	Siemens Energy
Guang Yuan	Yuan	Guang	Hitachi Energy

Attachment K.4.16

Task Force for Installation of Power Transformers C57.93
Tuesday, March 12, 2024
3:15 – 4:30 PM
Hyatt Regency Vancouver, Regency B
Vancouver, BC, Canada

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

Levent	Baser	Hitachi Energy	Guest
Barry	Beaster	Hj Family of Companies	Guest
Wallace	Binder	WBBinder Consultant	Guest
Sanket	Bolar	Oncor	Guest
Georges	Bouty	Delta Star	Guest
Jeremiah	Bradshaw	Bureau of Reclamation	Guest
Elizabeth	Bray	Southern Company	Guest
Stuart	Chambers	EPRI	Guest
Luiz	Cheim	Hitachi Energy	Guest
Mike	Craven	Qualous Power Services	Guest
Sami	Debass	EPRI	Guest
Gabriel	Delgado Zamora	Invenergy	Guest
Jesse	Duffy	Nashville Electric Service	Member
Evgenii	Ermakov	Hitachi Energy	Member
Florin	Faur	Prolec GE	Guest
Miguel	Fernandez	Braintree Electric Light Dept	Guest
Marcos	Ferreira	Quanta Technology	Guest
Rainer	Frotscher	Reinhausen	Guest
Lorne	Gara	Shermco	Member
Alexander	Gaun	Coil Innovation	Guest
Ismail	Guner	Hydro Quebec	Member
Saif	Hossain	Trench Ltd	Guest
Patrycja	Jarosz	IEEE SA	Guest
Jerzy	Kazmierczak	Hitachi Energy	Guest
Sheldon	Kennedy	Sheldon Kennedy Engineering	Guest
Stacey	Kessler	Ulteig Engineers	Guest
Yeounsoo	Kim	MEPPI	Guest
Mathieu	Lachance	Omicron	Guest
Jinming	Li	BC Hydro	Guest
Weijun	Li	Braintree Electric Light Dept	Member
Mario	Locarno	Doble	Member
Mama	Mbouombouo	Hitachi Energy	Guest
Toni	Mellin	Vaisala	Guest
David	Murray	TVA	Member

Ryan	Musgrove	OG&E	Member
Anthony	Natale	HICO America	Guest
Joe	Nims	Allen & Hoshall	Guest
David	Olan	BC Hydro	Guest
Eduardo	Orozco	GE Grid Solutions	Guest
Pedro	Pedro	Efacec Transformers	Guest
Dominic	Pollaro	NASS	Guest
Tom	Prevost	Weidmann	Guest
John	Pruente	Prolec GE Waukesha	Guest
Scott	Reed	MVA	Chair
Perry	Reeder	GE	Member
Sebastian	Rehkopf	Reinhausen	Guest
Jonathan	Reimer	FortisBC	Guest
Arash	Rezvan	Delta Star	Guest
Michael	Richardson	Ameren	Guest
Diego	Robalino	Megger	Guest
Mickel	Saad	Hitachi Energy	Member
Steven	Small	BC Hydro	Guest
William	Solano	Reinhausen	Member
Brian	Sparling	Dynamic Ratings	Member
Tommy	Spitzer	City Transformer Service Co.	Guest
Kyle	Stechschulte	AEP	Secretary
Charles	Sweetser	OMICRON electronics Corp USA	Guest
Jonathan	Tan	Northern Transformer	Guest
Troy	Tanaka	Burns & McDonnell	Guest
Marko	Teofanovic	Ontario Power Gener.	Guest
Eduardo	Tolcachir	TTE	Guest
Cole	Van Dreel	American Transmission Co	Guest
Alwyn	VanderWalt	ECI	Vice Chair
John	Wagner	AEP	Guest
Matthew	Webb	GE	Guest
Daniel	Weyer	Monolith	Guest
Terry	Wong	Trench Ltd	Guest
Deanna	Woods	ATC	Guest

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

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

There were 15 of 26 members, so a quorum was achieved and a total of 54 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 Evgenii Ermakov to accept the agenda and seconded by David Murray. The agenda was approved with unanimous consent. Next, a motion was made by Weijun Li and seconded by Evgenii Ermakov. The minutes were approved with unanimous consent.

The chair shared the existing title with the Task Force to determine if it needs to be changed. There was a motion by Weijun Li to keep the title as written and seconded by David Murray. After discussion the motion was amended to keep the current title as written, but add “and reactors”. The amended motion was seconded by Evgenii Ermakov. The motion was unanimously approved.

The chair shared the existing scope with the Task Force to determine if it needs changed. After much discussion the scope was changed to “The recommendations presented in this guide apply to the installation and maintenance of liquid-immersed power transformers and reactors”. There was a motion by Weijun Li to accept the new scope and seconded by Marcos Ferreira

Discussion was held to prepare for approval of the WG by the subcommittee. The intention is to form task forces to review specific sections of the document. Further approval of the task forces and their scopes will be defined later.

The meeting was adjourned at 4:28 p.m. After adjournment Brian Spalding made a motion to submit a PAR request before the Power Subcommittee. Kyle Stechschulte seconded the motion, and an email vote was distributed to the members. The motion passed.

Attachment K.4.18

Unapproved Meeting Minutes

PC57.153 TF Guide for Paralleling Regulating Transformers

Minutes from March 12, 2024 - Vancouver 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 March 12, 2024

2. Chairs Remarks

This is the first meeting of the working group for the revisions to C57.153. The PAR was approved during the October 2023 NESCOM meeting. The PAR for the working group expires December 2027. Being the first meeting of the working group, any attendees interested in becoming members should request membership on the attendance rosters being circulated.

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

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

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

3. Attendance

- There were 37 attendees in the meeting
    - 18 attendees requested membership
    - All attendees not requesting membership were added as guests

- Quorum check
    - N/A since this was the first meeting of the working group

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

4.1. Meeting Agenda

No revisions to the emailed agenda were made. No objection to unanimous approval of the meeting agenda.

4.2 Approval of the minutes from the last task force meeting in fall, 2023

No objection to unanimous approval of the meeting minutes from fall 2023 task force meeting.

5. Nomination and Approval of Officers for the Working Group

The chair asked if there was any objection appointing the vice chair and secretary from the task force as officers for the working group as proposed in the agenda. No objection to unanimous approval of the officers.

- Vice Chair: Cihangir John Sen
- Secretary: Zan Kiparizoski

6. Old Business

Title, Scope, and Purpose from the PAR which was approved in October 2023 were reviewed. NesCom comments related to the use of Master/Follower were briefly discussed. No decisions were made on whether any changes in the body of the document are required since the guidelines for the use of inclusive language are still being drafted by IEEE.

6.1 Updates from volunteers from the last task force meeting

Concept of apparent circulating currents.

Karsten Viereck of Reinhausen presented slides on how Annex C which discusses apparent circulating current could be improved.

Definition of reverse power flow

Discussed whether there are any established definitions in other standards which could be used in the guide. The Task Force for Reverse Power Flow Effects on Transformers would be the most likely standard to reference but they have not defined it yet. Since the task force doesn't have an approved PAR yet, the working group felt we needed to come up with our own definition to avoid any delays. Several proposals were made, and the working group approved the following language:

Reverse power flow - a system condition in which the power flow in the transformer is from the normal energy output side to the normal energy input side.

Acceptable actions during the presence of reverse power flow were also discussed.

Review of the reference documents used in the 2015 version of the guide.

Francis Mills from Power Engineers presented his review of the reference materials used in

the guide.

- He was not able to locate the CEMA standard referenced in the guide and is unsure whether the standard is still valid or if it has been replaced by another standard. WG members were not familiar with the standard. The Chair agreed to review drafts from the guide from the original working group to see if the drafts contain any additional information or if there is an error in the reference.
- Minor changes were identified in the other references. The draft of the guide will be updated to reflect his findings.

7. New Business

No new business was identified.

8. Next Meeting

The next scheduled meeting will be at the fall meeting on October 29, 2024.

9. The meeting adjourned at 5:25 PM

10. Minutes

The minutes were recorded by John Sen – Vice Chair and reviewed by Mark Tostrud – Chair

C57.153 – Guide for Paralleling Regulating Transformers			
Last Name	**First Name**	**Affiliation**	**Requested Membership**
Bargone	Giles	FISO	X
Blaydon	Daniel	Baltimor Electric	X
Carrizales	Juan Alfredo	Prolec GE	
Colopy	Craig	Retired	
Hoffman	Saramma	PPL	X
Viereck	Karsten	Reinhausen	X
Kessler	Stacey	Ulteig-Engineers	
Knapp	Evan	Eaton	X
Li	Weijun	Braintree Electric Light Dept.	X
Machain	Luis	Prolec GE	
Millls	Francis	Power Engineers	X
Musgrove	Ryan	Oklahoma Gas&Electric	X
Rossini	Yuri	Siemens Energy	
Sauer	Dan	Eaton	
Schleismann	Eric	Southern Company	X
Sen	Cihangir	Duke Energy	X
Stank	Markus	Reinhausen	X
Tostrud	Mark	Dynamic Ratings	Chair
Vir	Dharam	Prolec GE	X

Fernandez	Miguel	Braintree Electric Light Dept.	
Crockett	Janet	Fayetteville PWC	
Reyes	Juan	Hitachi Energy	
Heiden	Kyle	Eaton	X
Koshel	Anton	Delta Star	
Alonso	Mario	Georgia Transformer	X
Mendez	Omar	Prolec GE	
Welton	Drew	Intellivent	X
Rahmatian	Farnoosh	NuGrid Power	
Lewis	Samuel	Hitachi Energy	
Arevalo	Edmundo	Bonneville Power Association	
Vaagensmith	Bjorn	Idaho National Lab	
Ashcraft	Stephen	Hitachi Energy	
Ogajanov	Rudolf	Hitachi Energy	
Radu	Ion	Hitachi Energy	X
Salem	Sherif	Eversource Energy	X
Zhang	Shibao	Pcore Electric	X
Bender	Jon	W.E. Grundy & Associates	