

Annex K Power Transformers Subcommittee

November 17, 2021

Virtual Meeting

Meeting Time: 12:55-2:10 p.m. CT

Chair: Bill Griesacker

Vice Chair: Alwyn VanderWalt

Secretary: Daniel Blaydon

K.1 Meeting Attendance

The Power Transformers Subcommittee met on Wednesday, November 17, 2021 at 12:55 PM CT. The WebEx attendance record indicated that 91 out of 136 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 231 individuals attended the meeting; 5 guests requested membership.

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

K.2 Approval of Agenda and Meeting Minutes

The Chair asked the membership if there was any objection to unanimous approval of the proposed agenda. The agenda was approved without objection. The approved agenda can be found in Attachment K.2.

The Chair asked the membership if there was any objection to unanimous approval of the Spring 2021 meeting minutes. The minutes were approved without objection.

K.3 Chair's Remarks

The Chair noted that his term as Chair of the PTSC expired and that Ryan Musgrove (Oklahoma Gas & Electric) would be assuming the Chair position at the Spring 2022 meeting.

The Chair provided an overview 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 provided an overview of the present subcommittee membership roster.

K.4 Working Group and Task Force Reports

K.4.1 Liaison to PC57.93a IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – S. Reed

This is dealing with the topic of low temperature cold starts for transformers with natural ester. A meeting was held in July in China. The WG has developed a procedure for startup. They are also planning to perform testing which includes inserting fiber optics into the transformer to evaluate temperatures at different loading conditions. These tests will also include DGA samples to verify the results and to detect damage. It has not been determined when a follow-up meeting or the testing will be scheduled.

The complete meeting minutes can be found in Attachment K.4.1.

K.4.2 Revision of C57.125 Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors – H. Sahin

This working group met on Monday. This was the first meeting as a working group. 56 individuals requested and were granted membership. They reviewed the PAR which included a revision to the purpose statement. Several sections of the current document were presented with areas noted as needing updates. A question was raised whether the document applies to field failures only or also to factory test failures. They will consider

looking into this further and no decision was made at the meeting. They are seeking data from manufacturers and end users to help update guidance in the document.

The complete meeting minutes can be found in Attachment K.4.2.

K.4.3 Revision of C57.131 Tap Changers – C. Colopy

The working group met on Monday. A quorum was achieved. A draft and redline version of the document has been posted to the transformers committee website. They are trying to harmonize as much as they can with IEC 60214-1 standard. Since that document was published in 2014, they expect that next revision will be worked on in a couple of years. The working group has added in IEC references including additional info on vacuum tap changers, SF6 tap changers, and voltage regulators. They expect to have a few virtual off schedule meetings before the spring meeting.

The complete meeting minutes can be found in Attachment K.4.3.

K.4.4 Revision of C57.143 – Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Equipment – M. Spurlock

This working group met on Monday and a quorum was achieved. Major revisions have been made to several sections of the document related to monitoring of load tap changers, DGA, moisture, bushings, and GMD. A new section has been submitted for online transient frequency response monitoring. The PAR expires at the end of 2021, but they did receive a PAR extension until December 2023. They are working towards completing the document by end of 2022. The cutoff date for revisions will be Jan 3, 2022. A motion was made to start a straw ballot after the guide is ready in January which passed.

The complete meeting minutes can be found in Attachment K.4.4.

K.4.5 Revision of C57.150 Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or Larger – G. Anderson

This group did not meet. The PAR for this working group expires December 31, 2021. NesCom will meet on December 7, to consider a 2 year PAR extension request. They plan to send the draft document to the WG for review and comment with a goal to have the document approved to go to ballot at the Spring 2022 Committee Meeting. They will likely have some off-cycle virtual meetings to accomplish this.

K.4.6 Task Force on V/Hz Curve – J. Watson

This was the first meeting as a working group. 31 individuals requested and were granted membership. A PAR was granted which does not expire until 2025. They are planning on going through straw ballots before going to ballot in the Fall 2023. They discussed the need to develop a philosophy on the temperature limits for oil and insulating materials and how they will affect the V/Hz curves for each transformer. The general consensus was that the V/Hz curves should document the operating conditions that would cause no damage or accelerated loss-of-life to insulation or other parts of the transformer. The Committee has other Subcommittees and WG's that have done extensive work in these areas. A TF was created to develop the philosophy and to reach out to other groups for guidance.

The complete update can be found in Attachment K.4.6.

K.4.7 Development of PC57.170 Condition Assessment Guide – K. Mani

A pre-draft version of this document has been circulated within the working group. They are actively seeking experts to join the WG.

The complete meeting minutes can be found in Attachment K.4.7.

K.4.8 Revision of C57.116 GSU Transformers – W. Li

This working group met on Monday and achieved a quorum. This working group is split into 4 task forces to review various sections of document to identify changes that should be made. Each task force provided updates on their work at the meeting. The WG voted to accept all proposed changes except for changes on

Clause 6, which will be addressed and resubmitted to the WG for review and approval. They plan to finalize their work by Spring 2022 so that the draft may be submitted by the end of 2022.

The complete meeting minutes can be found in Attachment K.4.8.

K.4.9 PAR Study Group for C57.135, Phase Shifting Transformers - E. Schweiger

A PAR study group was formed in last PTSC meeting. They held a meeting virtually last Wednesday with 16 members present. The Power System Relaying and Control Committee asked for harmonization with their standards. There was also a dual logo discussion. An email was sent to all members after the meeting to vote to report back to PTSC with a recommendation to form a WG to revise the document.

Ewald Schweiger then made a motion to recommend to PTSC to form a Working Group to revise C57.135 Phase shifting transformers.

A concern was brought up whether the PAR information would be identical to the existing document. A motion was made by Gary Hoffman to table the current motion until the end of the meeting which was seconded by Dan Sauer.

The complete meeting minutes can be found in Attachment K.4.9.

K.5 Old Business

No old business.

K.6 New Business

1. The motion to create a working group to revise C57.135 Phase Shifting Transformers was revisited. Ewald Schweiger reviewed the PAR for C57.135. It was noted that title is slightly different, dropping "IEEE" in the title and changing some of the punctuation. A member of Power System Relaying and Control Committee present in the meeting mentioned that one suggested change was to remove protection from the purpose statement since this expertise is in PSRC. It was pointed out that PARs are not required to have a purpose statement. It was suggested that just the title and scope be provided in the new PAR to resolve this issue. Ewald Schweiger made a motion to form a WG based on the existing title and scope in the PAR document. This motion was withdrawn without objection. Ewald Schweiger presented a motion to request the PTSC to approve establishing a PAR based on info presented in PAR document reviewed during the meeting, as recommended by the PAR study group. No second required. During discussion, it was discussed to invite IEC if it will become a dual logo revision. This will need to be considered when developing the PAR. Steven Shull made a motion to move to the question. This was seconded by Dan Sauer. There were no objections to this motion. The motion was approved by unanimous consent.
2. The Chair stated that the following documents will be referenced in an email sent to the PTSC following the meeting, requesting approval for PAR study groups to be formed.
 - a. C57.153 Paralleling Guide – expires 12/31/25
 - b. C57.156 Tank Rupture – expires 12/31/26
 - c. C57.157 Contact Functional Life – expires 12/31/25

K.7 Adjournment

The meeting adjourned at 2:12pm CT.

K.8 Attachments

Attachment K.1 – Attendance

Attachment K.2 – S21 PTSC Agenda

Attachment K 4.1 - PC57.93a Minutes

Attachment K 4.2 – C57.125 Minutes

Attachment K 4.3 – C57.131 Minutes

Attachment K 4.4 – C57.143 Minutes

Attachment K 4.6 – V/HZ Minutes

Attachment K 4.7 – C57.170 Minutes

Attachment K 4.8 – C57.116 Minutes

Attachment K 4.9 – C57.135 Minutes

Role	First Name	Last Name	Company
Member	Gregory	Anderson	GW Anderson & Associates, Inc.
Member	Susan	McNelly	Xcel Energy
Guest	Dennis	Marlow	DenMar TDS Transformers
Member	Bruce	Forsyth	Bruce Forsyth and Associates PLLC
Guest	James	Gardner	SPX Transformer Solutions, Inc.
Guest	Jeff	Benach	Megger
Guest	Thomas	Blackburn	Gene Blackburn Engineering
Member	William	Boettger	Boettger Transformer Consulting LLC
Chair	Bill	Griesacker	Duquesne Light Co.
Member	Joseph	Foldi	Foldi & Associates, Inc.
Member	Joe	Watson	JD Watson and Associates Inc.
Guest	Stephen	Schroeder	Hitachi Energy
Member	Juan	Castellanos	Prolec GE
Guest	Barry	Beaster	H-J Family of Companies
Guest	Larry	Dix	Quality Switch, Inc.
Member	Javier	Arteaga	Hitachi Energy
Member	Eduardo	Garcia Wild	Siemens Energy
Member	Raj	Ahuja	Raj Ahuja Consulting
Guest	Lee	Matthews	Howard Industries
Member	Dinesh	Sankarakurup	Duke Energy
Guest	Ed	teNyenhuis	Hitachi Energy
Guest	Stephen	Jordan	Tennessee Valley Authority
Member	Emilio	Morales-Cruz	Qualitrol Company LLC
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Loren	Wagenaar	WagenTrans Consulting
Member	Donald	Ayers	Ayers Transformer Consulting
Guest	Dieter	Wagner	Hydro One
Member	Ramsis	Girgis	Hitachi Energy
Guest	Ali	Ghafourian	H-J Enterprises, Inc.
Member	Wallace	Binder	WBBinder Consultant
Member	Philip	Hopkinson	HVOLT Inc.
Guest	Paul	Jarman	University of Manchester
Member	Sheldon	Kennedy	Niagara Transformer
Guest	John	Crouse	Roswell Alliance
Member	Axel	Kraemer	Maschinenfabrik Reinhausen
Member	Christopher	Baumgartner	We Energies
Member	Enrique	Betancourt	Prolec GE
Guest	Devki	Sharma	Entergy
Member	Peter	Zhao	Hydro One
Guest	Sanjay	Patel	Smit Transformer
Guest	Gael	Kennedy	GR Kennedy & Associates LLC
Member	Ewald	Schweiger	Siemens Energy
Member	Reto	Fausch	RF Solutions
Member	Craig	Colopy	EATON Corporation

Member	Steven	Schappell	SPX Transformer Solutions, Inc.
Guest	Waldemar	Ziomek	PTI Transformers
Member	Vinay	Mehrotra	SPX Transformer Solutions, Inc.
Member	Eric	Davis	Burns & McDonnell
Member	Paul	Boman	Hartford Steam Boiler
Member	Rogério	Verdolin	Verdolin Solutions Inc.
Member	Gary	Hoffman	Advanced Power Technologies
Member	Scott	Reed	MVA
Guest	James	Mciver	Siemens Energy
Member	Don	Dorris	Nashville Electric Service
Member	Scott	Digby	Duke Energy
Guest	Clemens	Reiss IV	Custom Materials, Inc.
Member	Luiz	Cheim	Hitachi Energy
Guest	Jeremy	Sewell	Quality Switch, Inc.
Member	David	Wallach	Duke Energy
Member	Stephen	Shull	BBC Electrical Services, Inc.
Member	James	Graham	Weidmann Electrical Technology
Member	Roger	Hayes	General Electric
Member	Marcos	Ferreira	Beale AFB
Member	Mike	Spurlock	Spurlock Engineering Services, LLC
Guest	James	McBride	JMX Services, Inc.
Guest	Brian	Sparling	Dynamic Ratings, Inc.
Member	Laszlo	Kadar	Hatch
Guest	George	Frimpong	Hitachi Energy
Member	Donald	Lamontagne	Arizona Public Service Co.
Member	Markus	Stank	Maschinenfabrik Reinhausen
Guest	Alexander	Kraetge	OMICRON electronics Deutschland GmbH
Guest	Peter	Werelius	Megger
Guest	Rodrigo	Ocon	Industrias IEM
Guest	Marco	Espindola	Hitachi Energy
Guest	John	Pruente	SPX Transformer Solutions, Inc.
Guest	Olivier	Lejay	Huaming USA Corp.
Guest	Hakan	Sahin	Virginia/Georgia Transformer
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Member	Zan	Kiparizoski	Howard Industries
Guest	Jose	Gamboa	H-J Family of Companies
Guest	Juan Carlos	Cruz Valdes	Prolec GE
Guest	Ryan	Thompson	Burns & McDonnell
Member	Sanjib	Som	Pennsylvania Transformer
Secretary	Daniel	Blaydon	Baltimore Gas & Electric
Guest	Xose	Lopez-Fernandez	Universidade de Vigo
Member	Daniel	Sauer	EATON Corporation
Guest	Pugal	Selvaraj	Virginia Transformer Corp.
Member	Ajith	Varghese	SPX Transformer Solutions, Inc.
Guest	Kenneth	Skinger	Scituate Consulting, Inc.

Guest	Huan	Dinh	Hitachi Energy
Guest	Harry	Pepe	Phenix Technologies, Inc.
Guest	Mario	Locarno	Doble Engineering Co.
Guest	Jeffrey	Schneider	Power Partners/Spire Power Solutions
Guest	Ali	Naderian	METSCO Energy Solutions Inc.
Member	Ryan	Musgrove	Oklahoma Gas & Electric
Guest	Diego	Robalino	Megger
Guest	Jos	Veens	SMIT Transformatoren B.V.
Guest	Jagdish	Burde	Virginia Transformer Corp
Guest	Roderick	Sauls	Southern Company Services
Member	Parminder	Panesar	Virginia Transformer Corp.
Guest	Leopoldo	Rodriguez	Transformer Testing Services LLC
Guest	Rob	Ghosh	General Electric
Member	David	Murray	Tennessee Valley Authority
Member	Sukhdev	Walia	New Energy Power Co.
Guest	Larry	Christodoulou	Electric Power Systems
Guest	John	Poelma	NRG Energy
Guest	Donnell	Rackley	RESA Power
Member	Hugo	Flores	Hitachi Energy
Member	Weijun	Li	Braintree Electric Light Dept.
Member	Adam	Sewell	Quality Switch, Inc.
Member	John	John	Virginia Transformer Corp.
Member	William	Solano	Instrument Transformer Equip Corp
Guest	Ronald	Hernandez	Doble Engineering Co.
Member	Steven	Brzoznowski	Bonneville Power Administration
Guest	Mats	Bernesjo	Hitachi Energy
Guest	Marc	Taylor	JFE Shoji Power Canada Inc.
Member	Elizabeth	Bray	Southern Company Services
Guest	Patrick	Rock	American Transmission Co.
Guest	Paul	Morakinyo	PSEG
Guest	Christopher	Whitten	Hitachi Energy
Guest	Amitabh	Sarkar	Virginia Transformer Corp.
Guest	Alvaro	Portillo	Ing. Alvaro Portillo
Member	Kurt	Kaineder	Siemens Energy
Guest	Robert	Mayer	Siemens Energy
Member	Markus	Schiessl	SGB
Vice-Chair	Alwyn	Van Der Walt	Electrical Consultants, Inc.
Guest	Kevin	Biggie	Weidmann Electrical Technology
Guest	Thomas	Hartmann	Pepco Holdings Inc.
Guest	Christopher	Slattery	FirstEnergy Corp.
Member	Fabian	Stacy	Hitachi Energy
Guest	Toby	Johnson	Hunt Electric
Member	Kristopher	Neild	Megger
Member	Jason	Varnell	Doble Engineering Co.
Guest	Jonathan	Reimer	FortisBC
Member	Ismail	Guner	Hydro-Quebec

Member	Jeffrey	Wright	Duquesne Light Co.
Member	Anthony	Franchitti	PECO Energy Company
Guest	Rashed	Minhaz	Transformer Consulting Services Inc.
Guest	Peter	Sheridan	SGB USA, Inc.
Member	David	Geibel	--
Guest	Michael	Thompson	SEL Engineering Services, Inc.
Member	Hakim	Dulac	Qualitrol Company LLC
Guest	Anand	Zanwar	Siemens Energy
Guest	Michael	Dahlke	Central Moloney, Inc.
Member	Kris	Zibert	Allgeier, Martin and Associates
Member	Attila	Gyore	M&I Materials Ltd
Member	Jorge	Cruz	PTI Transformers
Guest	Zoran	Goncin	PTI Transformers
Member	Niklas	Gustavsson	Hitachi Energy
Guest	Jinesh	Malde	M&I Materials Inc.
Member	Dr. Alexander	Winter	HIGHVOLT Pruftechnik Dresden
Guest	Joshua	Yun	Virginia Transformer Corp.
Guest	Anton	Koshel	Delta Star Inc.
Guest	Trenton	Williams	Advanced Power Technologies
Guest	Philip	Miller	Memphis Light, Gas & Water
Guest	Timothy	Tillery	Howard Industries
Guest	Jeremiah	Bradshaw	Bureau of Reclamation
Member	William	Whitehead	H2scan Corporation
Member	Anastasia	O'Malley	Consolidated Edison Co. of NY
Member	Alan	Sbravati	Cargill, Inc.
Member	Feras	Fattal	Manitoba Hydro
Member	Peter	Kleine	US Army Corps of Engineers
Member	Mickel	Saad	Hitachi Energy
Guest	Malia	Zaman	IEEE
Member	Roger	Fenton	Fenton Solutions
Guest	Cihangir	Sen	Duke Energy
Member	Stacey	Kessler	TC Energy
Member	Daniel	Weyer	Nebraska Public Power District
Member	Janusz	Szczechowski	Maschinenfabrik Reinhausen
Member	Deepak	Kumaria	Applied Materials
Guest	Elise	Arnold	SGB
Member	Ion	Radu	Hitachi Energy
Guest	Drew	Welton	Intellirent
Member	Brad	Staley	Salt River Project
Member	Muhammad Ali Masood	Cheema	Northern Transformer
Member	Dan	Schwartz	Quality Switch, Inc.
Member	Gilles	Bargone	FISO Technologies Inc.
Guest	John	Reagan	RWE Renewables
Guest	Jose Antonio	Gonzalez Ceballos	Georgia Transformer
Member	Bruce	Webb	Knoxville Utilities Board

Guest	Dejan	Vukovic	Hitachi Energy
Member	David	Calitz	Siemens Energy
Member	Darrell	Mangubat	Siemens Energy SAE
Member	Hugh	Waldrop	Memphis Light, Gas & Water
Member	Samraghi	Dutta Roy	Siemens Energy
Member	Dmitriy	Klempner	Southern California Edison
Member	Kyle	Stechschulte	American Electric Power
Guest	Shawn	Gossett	Ameren
Guest	Afshin	Rezaei-Zare	York University
Guest	Jonathan	Sinclair	PPL Electric Utilities
Member	Saramma	Hoffman	PPL Electric Utilities
Member	Matthew	McFadden	Oncor Electric Delivery
Guest	Jeffrey	Door	H-J Family of Companies
Guest	Zachary	Draper	Delta-X Research Inc.
Guest	Tim	Rocque	SPX Transformer Solutions, Inc.
Guest	Stefan	Schindler	Maschinenfabrik Reinhausen
Guest	Raymond	Frazier	Ameren
Guest	Alan	Washburn	Burns & McDonnell
Member	Kayland	Adams	SPX Transformer Solutions, Inc.
Member	Pragnesh	Vyas	Sunbelt-Solomon Solutions
Guest	Anatoliy	Mudryk	Camlin Power
Guest	Edmundo	Arevalo	Bonneville Power Administration
Member	Evgenii	Ermakov	Hitachi Energy
Guest	Brandon	Dent	Memphis Light, Gas & Water
Guest	Andrew	Larison	Hitachi Energy
Guest	Albert	Sanchez	Knoxville Utilities Board
Guest	Balakrishnan	Mani	Virginia Transformer Corp.
Guest	Nabi	Almeida	Prolec GE
Member	Suresh	Babanna	SPX Transformer Solutions, Inc.
Guest	David	Holland	ExxonMobil
Guest	Taylor	Gray	Portland General Electric (PGE)
Guest	Nicholas	Jensen	Delta Star Inc.
Guest	Ryan	Hogg	Bureau of Reclamation
Guest	Michael	Richardson	Ameren
Guest	Kannan	Veeran	Georgia Transformer
Guest	Hampton	Steele	Tennessee Valley Authority
Guest	Juan Alfredo	Carrizales	Prolec GE
Guest	Thomas	Eagle	SPX Transformer Solutions, Inc.
Guest	Josue	Rodriguez	Prolec GE
Guest	Jennie	Aldenlid	Hitachi Energy
Guest	Daniel	Huenger	PCORE Electric
Guest	Sebastian	Rehkopf	Maschinenfabrik Reinhausen
Guest	Nathan	Katz	PacifiCorp
Guest	Sudip	Chanda	Virginia Transformer Corp.
Guest	Matthew	Pinard	Weidmann Electrical Technology

AGENDA

Power Transformers Subcommittee

IEEE PES Transformers Committee

Wednesday, November 17, 2021, 12:55-2:10 PM CST, Session 2

On-Line Meeting; Virtual

Bill Griesacker – Chair, Alwyn VanderWalt – Vice Chair, Dan Blaydon – Secretary

1. Call to order
2. Determine quorum
3. Approval of agenda, approval of previous meeting minutes
4. Chair remarks
5. Working Group and Task Force reports
 - a. PAR Study Group for C57.17, Arc Furnace Transformers D. Corsi
 - b. PAR Study Group for C57.93, Installation and Maintenance Guide ... S. Reed
 - c. WG Revision of C57.116, GSU Transformers W. Li
 - d. WG Revision of C57.125, Failure Investigating and Reporting H. Sahin
 - e. WG Revision of C57-131, Tap Changers C. Colopy
 - f. PAR Study Group for C57.135, Phase Shifting Transformers..... E. Schweiger
 - g. WG Revision of C57.143, Monitoring Guide M. Spurlock
 - h. WG Revision of C57.150, Transportation Guide G. Anderson
 - i. WG C57.170, Condition Assessment Guide K. Mani
 - j. PAR Study Group for Transformer Volts per Hertz J. Watson
 - k. PAR Study Group for IEEE 638 Class 1E Xfmrs for Nuclear Stations ... C. Swinderman
 - l. Liaison to PC57.93a – Installation and Maintenance Guide S. Reed
6. Old business
7. New business
8. Adjournment

Working Group for Installation & Maintenance of Power Transformers C57.93a
 9:00 am – 10:40 am
 Chongqing, China
 Thursday, July 22, 2021

Chairman Wei Yao
 Vice Chairman Feipeng Wang
 Secretary Hanbo Zheng

The meeting was called to order at 9:00 am by Chair Wei Yao.

There were 39 members present. A membership quorum was achieved.

Attendees:

1	Wei Yao (chair)	21	Yunpeng Liu
2	Xiaohui Yang	22	Jie Liu
3	Tao Yang	23	Huaqiang Li
4	Ji Wang	24	Guochao Qian
5	Tian Wang	25	Qingdan Huang
6	Xuehuan Li	26	Yihua Qian
7	Wei Wang	27	Qing Wang
8	Hua Yu	28	Zhiqiang Huang
9	Kai Liu	29	Xiaoming Yue
10	Mengzhao Zhu	30	Bo Gao
11	Wei Sun	31	Xianqing Guo
12	Shaigen Han	32	Xingyu Chen
13	Shengwei Cai	33	Xuan Xuan
14	Qian Hong	34	Li Li
15	Feipeng Wang (vice chair)	35	Ruifeng Wang
16	Zhengyong Huang	36	Songjiang Li
17	Jian Hao	37	Ting Hu
18	Hanbo Zheng (secretary)	38	Xianwei Wu
19	Jinhua Han	39	Malia Zaman
20	Tao Zhao		

Agenda

1. Call to order and introduction
2. Approval of the Agenda
3. Call for patents
4. Review the minutes of the kick-off meeting
5. Appointment of WG Officers
6. Appointment of WG vice-chair and secretary
7. Technical Discussion
8. Task Assignment
9. Summary
10. Adjournment

The 2020 Agenda was unanimously approved.

Malia Zaman posted the Patent Claim. No notifications or comments were received.

Chair's Remarks:

Chairman Yao reviewed the minutes of the kick-off meeting. Next, he presented the Meeting Agenda of WG PC57.93a and the candidates for WG vice-chair and secretary. Next, he made a presentation on PC57.93a about properties of natural ester fluid at cold temperatures, including: kinematic viscosity, moisture content, density, and breakdown characteristics change with temperature under low temperature conditions.

Songjiang Li made a speech:

The breakdown characteristics of insulating liquid depends on its water content. It is recommended to measure the low temperature breakdown characteristics of the maximum water content required by the current standard.

Ruifeng Wang made a speech:

According to the maximum moisture content (300 ppm) of natural esters in the current standard, it is recommended to measure the breakdown characteristics of natural esters at this moisture content.

The motion passed unanimously.

Xianqing Guo and Ruifeng Wang introduced the low-temperature cold start test protocol of vegetable transformer oil. Including:

1. No-load and step-by-step loading cold start test for transformers
2. Cold start tests with immediate full load for transformers
3. Routine test of transformers

Yunpeng Liu suggested that in the follow-up test, some optical fiber temperature measurement points can be arranged inside the transformer to judge the change of the internal temperatures.

The motion passed unanimously.

No new business was discussed.

The meeting was adjourned at 10:40 am. The next meeting would be held on October 2021.

Hanbo Zheng, Secretary

Power Transformer 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** 0% (first WG meeting)

Current Draft Being Worked On: n/a-first WG meeting **Dated:** n/a

PAR Expiration Date: December 31, 2025

Meeting Date: 15 November 2021 **Time:** 3:45pm CST

Location: Virtual Online Meeting

K.9	Attendance:	K.10	Members	<u>0-first WG meeting</u>
	K.11	K.12	Guests	<u>31</u>
	K.13	K.14	Guests Requesting Membership	<u>56 (all given membership)</u>
	K.15	K.16	Total*	<u>87</u>

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

Meeting Minutes / Significant Issues / Comments:

Meeting was called to order at 3:45pm CST, November 15, 2021.

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. Introduction of the new officers
 - i. Chair: Hakan Sahin
 - ii. Vice-Chair: Tom Melle
 - iii. Secretary: Adam Sewell
 - d. Update on membership since this is first meeting as a working group
 - i. All attendees requesting membership were given membership and quorum was achieved since all members were present.
 - e. Approval of Agenda
 - i. No opposition to unanimous approval. APPROVED
 - f. Approval of minutes from Sprint 2021 TF- Study Group Meeting

- i. Not needed since this is the first Working Group meeting and previous meeting was Task Force

2. Business

- a. Review the motion which was approved during the spring meeting to advance the PAR to a Working Group, its path forward and the timeline
- b. Discussions on the past motion to revise the purpose statement
 - i. Wallace Binder, Bill Griesacker and Bruce Forsyth commented that the beginning of the purpose statement is already revised and no need to try to revise the purpose again, unless the WG decides to do so later. After the meeting Chair confirmed these comments and corrects his statement that the purpose has already been revised per the previous motion, and the WG will focus on the review and update of the current document as it is stated in the PAR Ballot:

5.5 Need for the Project: Review and update the document as it expires on 12/31/2025.

Change to Need for the Project: Revise, Review and consolidate update two the existing document guides as that it cover expires the on subject of transformer reliability.C57 12/31/2025 . 117 C57.125

- c. Chair’s recommendations with group discussions on the sections and clauses that can be reviewed and updated within C57.125
 - i. Expectation from the WG is to review and update the document as it expires on 12/31/2025
 - ii. Chair covered 2 sections related to the flow chart in the existing document that can be updated, and used these as examples to ask members to review the document and point out sections that may need review and update
 - iii. There was a discussion on whether the document applies to field failures only or could be reviewed to adapt to factory acceptance tests. Agreed to keep this document as guide for field failure investigation by the Power Transformers Subcommittee later after the meeting.
 - iv. Chair commented that the data collection from manufacturers and end users would be a critical task due to their confidentiality, however more data and case studies would be very helpful to add better guidance within the document
 - v. Expectation from this WG is to review and update the existing document, hence looking for inputs and volunteers to review the document and send feedback as new business requests

3. New Business

- a. As this was the first WG meeting, Chair asked everyone who wants to be a member and continue the work to view the existing document and email ahead of the next meeting with new sections which may need update

4. Next meeting: TBD at Spring 2022 Transformer Committee Meeting scheduled for March 27-31, 2022 in Denver, Colorado, USA.

5. Close of meeting

- a. Meeting adjourned at 4:45pm CST

Submitted by: Hakan Sahin Date: 11/19/201

Meeting Attendance:

First Name	Last Name	Affiliation	Role
Raj	Ahuja	Raj Ahuja Consulting	Guest
Tauhid Haque	Ansari	Hitachi Energy	Member
Suresh	Babanna	SPX Transformer Solutions, Inc.	Member
Gilles	Bargone	FISO Technologies Inc.	Guest

First Name	Last Name	Affiliation	Role
Tiffany	Lucas, P.E.	SPX Transformer Solutions, Inc.	Guest
Matthew	McFadden	Oncor Electric Delivery	Member
Aaron	Meyers	EATON Corporation	Guest
Ryan	Musgrove	Oklahoma Gas & Electric	Member

First Name	Last Name	Affiliation	Role
Jared	Bates	Oncor Electric Delivery	Guest
Duvier	Bedoya	Hitachi Energy	Member
Enrique	Betancourt	Prolec GE	Member
Wallace	Binder	WBBinder Consultant	Member
William	Boettger	Boettger Transformer Consulting LLC	Member
Sanket	Bolar	Megger	Member
Michael	Botti	Hyosung HICO	Member
Juan Alfredo	Carrizales	Prolec GE	Guest
Larry	Christodoulou	Electric Power Systems	Guest
Colin	Clark	AltaLink	Member
Craig	Colopy	EATON Corporation	Guest
John	Crouse	Roswell Alliance	Member
Everton	De Oliveira	Siemens Energy	Member
Larry	Dix	Quality Switch, Inc.	Member
Thomas	Eagle	SPX Transformer Solutions, Inc.	Guest
Wayne	Ellis	Memphis Light, Gas & Water	Guest
Marco	Espindola	Hitachi Energy	Member
Edmund	Feloni	CEG Forensics LLC	Member
Bruce	Forsyth	Bruce Forsyth and Associates PLLC	Member
Eduardo	Garcia Wild	Siemens Energy	Member
Rob	Ghosh	General Electric	Member
Bill	Griesacker	Duquesne Light Co.	Member

First Name	Last Name	Affiliation	Role
Ali	Naderian	METSCO Energy Solutions Inc.	Guest
Livia	Neeson	Entergy	Guest
Anastasia	O'Malley	Consolidated Edison Co. of NY	Member
Rajkumar	Padmawar	ASAsoft (Canada) Inc	Guest
Parminder	Panesar	Virginia Transformer Corp.	Member
Sanjay	Patel	Smit Transformer	Member
Matthew	Pinard	Weidmann Electrical Technology	Guest
Lesther Alex	Quispe Cuadrado	EATON Corporation	Member
Kevin	Rapp	Cargill, Inc.	Member
John	Reagan	RWE Renewables	Guest
Diego	Robalino	Megger	Member
Leopoldo	Rodriguez	Transformer Testing Services LLC	Guest
Mickel	Saad	Hitachi Energy	Guest
Hakan	Sahin	Virginia/Georgia Transformer	Chair
Albert	Sanchez	Knoxville Utilities Board	Member
Amitabh	Sarkar	Virginia Transformer Corp.	Member
Roderick	Sauls	Southern Company Services	Member
Anil	Sawant	Virginia Transformer Corp.	Guest
Pugal	Selvaraj	Virginia Transformer Corp.	Member
Adam	Sewell	Quality Switch, Inc.	Secretary
Samuel	Sharpless	Rimkus Consulting Group	Member
Neil	Strongosky	Memphis Light, Gas & Water	Guest

First Name	Last Name	Affiliation	Role
Roger	Grubb	EATON Corporation	Guest
Ismail	Guner	Hydro-Quebec	Guest
Thomas	Hartmann	Pepco Holdings Inc.	Member
Ronald	Hernandez	Doble Engineering Co.	Member
Sergio	Hernandez Cano	Hammond Power Solutions	Member
John	Herron	Raytech USA	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
John	John	Virginia Transformer Corp.	Member
Laszlo	Kadar	Hatch	Member
Gael	Kennedy	GR Kennedy & Associates LLC	Guest
Sheldon	Kennedy	Niagara Transformer	Guest
Stacey	Kessler	TC Energy	Member
Zan	Kiparizoski	Howard Industries	Guest
Axel	Kraemer	Maschinenfabrik Reinhausen	Member
Alexander	Kraetge	OMICRON electronics Deutschland GmbH	Member
Deepak	Kumaria	Applied Materials	Member
Fernando	Leal	Prolec GE	Member
Weijun	Li	Braintree Electric Light Dept.	Member

First Name	Last Name	Affiliation	Role
Janusz	Szczechowski	Maschinenfabrik Reinhausen	Member
Troy	Tanaka	Burns & McDonnell	Member
Marc	Taylor	JFE Shoji Power Canada Inc.	Member
Ed	teNyenhuis	Hitachi Energy	Member
Reza	Torabi Goodarzi	SMIT Transformatoren B.V.	Member
Risto	Trifunoski	Trench Limited	Guest
Jason	Varnell	Doble Engineering Co.	Member
Jos	Veens	SMIT Transformatoren B.V.	Guest
Kannan	Veeran	Georgia Transformer	Guest
Rogério	Verdolin	Verdolin Solutions Inc.	Member
Richard	vonGemmingen	Dominion Energy	Member
Dieter	Wagner	Hydro One	Member
Sukhdev	Walia	New Energy Power Co.	Member
Alan	Washburn	Burns & McDonnell	Member
Bruce	Webb	Knoxville Utilities Board	Guest
Helena	Wilhelm	Vegoor Tecnologia Aplicada	Member
Malia	Zaman	IEEE	Guest

Power Transformer Subcommittee Working Group Report

Document #: C57.131

Document Title: Standard Performance Requirements and Test Methods for Tap-changers

Chair: Craig A. Colopy **Vice-Chair** Axel Kraemer

Secretary Adam M. Sewell **Percent Complete** 25%

Current Draft Being Worked On: 1.0 **Dated:** November 2021

PAR Expiration Date: December 31, 2024

Meeting Date: 15 November 2021 **Time:** 9:25am-10:40am CST

Location: Virtual Online Meeting

K.17	Attendance:	K.18	Members	<u>22 out of 27</u>
	K.19	K.20	Guests	<u>42</u>
	K.21	K.22	Guests Requesting Membership	<u>20 (all given membership)</u>
	K.23	K.24	Total*	<u>84</u>

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

Meeting Minutes / Significant Issues / Comments:

6. Meeting was called to order at 9:25am CST, November 15, 2021.
7. Opening of meeting and officer introductions.
 - a. Chair-Craig Colopy-EATON Corporation, Vice Chair-Axel Kraemer-Maschinenfabrik Reinhausen, Secretary-Adam Sewell-Quality Switch, Inc.
8. Call for patent disclosure
 - a. No comments made from attendees
9. Chair remarks
 - a. Direct adoption of IEC 60214-1 (2014) was not allowed so a revision and harmonization of existing C57.131-2012 with 60214-1 was next option since it expires at end of 2022.
 - b. Draft 1.0 and Redline version were posted on Transformer Committee-Power Subcommittee website Nov 8, 2021.
 - c. Plan to have virtual meeting(s) before next Transformer Committee meeting.
10. Quorum Check - Poll - Request for Members
 - a. 27 members before meeting in working group - quorum is at least 14 members...22 members were in attendance (18 answered quorum poll which was enough)

b. 20 Guests requesting membership were done in chat and given membership

11. Approval of Agenda

a. Motion – D. Geibel, 2nd-A.Kraemer. No opposition to unanimous approval. APPROVED

12. Approval of minutes from Sprint 2021 Virtual Meeting

a. Motion – L.Dix, 2nd-D.Geibel. No opposition to unanimous approval. APPROVED

13. Discussion on Draft 1.0

- a. Current C57.131-2012 expires in 2022
- b. Harmonize existing C57.131-2012 with IEC standard 60214-1 Ed. 2.0. May 2014
- c. Addition of IEC references, vacuum tap-changers, SF₆ tap-changers, and voltage regulators
- d. Concern of IEC referenced standards in the draft.
 - i. Chair to check if referenced IEC standards would be available to WG members for review.
 - ii. A. Kraemer proposed to use a similar paragraph as §4 of 60214-2 in C57.131 saying that the document can be used with IEC or IEEE references but that they shall not be mixed

14. Next meeting: TBD at Spring 2022 Transformer Committee Meeting scheduled for March 27-31, 2022 in Denver, Colorado, USA.

a. May have virtual meeting before Spring 2022 Transformer Committee Meeting organized by chair.

15. Close of meeting

a. Meeting adjourned at 10:15am CST. Motion – L. Dix, 2nd – A. Kraemer. No opposition to unanimous approval. ADJOURNED.

Submitted by: Craig A. Colopy

Date: _____

Meeting Attendance:

Last Name	First Name	Company	Role
Adams	Kayland	SPX Transformer Solutions, Inc.	Guest
Aldenlid	Jennie	Hitachi Energy	Member
Ali	Rehan	Siemens Energy	Guest
Arevalo	Edmundo	Bonneville Power Administration	Guest
Bartek	Allan	Spruce Run Engineering LLC	Member
Behrens	Tammy	SPX Transformer Solutions, Inc.	Guest
Blaszczyk	Piotr	Specialty Transformer Components LLC	Member
Boettger	William	Boettger Transformer Consulting LLC	Guest
Buchgeher	Erich	Siemens Energy	Guest
Burde	Jagdish	Virginia Transformer Corp	Member

Last Name	First Name	Company	Role
Munoz Molina	Martin	Orto de Mexico	Member
Neild	Kristopher	Megger	Member
Patel	Sanjay	Smit Transformer	Guest
Pitts	Chris	Howard Industries	Guest
Polson	Adam	Arizona Public Service Co.	Guest
Pruente	John	SPX Transformer Solutions, Inc.	Member
Raymond	Timothy	Electric Power Research Institute (EPRI)	Member
Rehkopf	Sebastian	Maschinenfabrik Reinhausen	Guest
Richardson	Michael	Ameren	Guest
Rocque	Tim	SPX Transformer Solutions, Inc.	Guest

Last Name	First Name	Company	Role
Calitz	David	Siemens Energy	Member
Carrizales	Juan Alfredo	Prolec GE	Guest
Castellanos	Juan	Prolec GE	Guest
Colopy	Craig	EATON Corporation	Chair
Cruz Valdes	Juan Carlos	Prolec GE	Member
Dauzat	Thomas	General Electric	Member
Dent	Brandon	Memphis Light, Gas & Water	Guest
Dix	Larry	Quality Switch, Inc.	Member
Ellis	Wayne	Memphis Light, Gas & Water	Guest
Ember Baci	Daniela	Hydro-Quebec IREQ	Guest
Fausch	Reto	RF Solutions	Guest
Ferreira	Marcos	Beale AFB	Member
Flores	Hugo	Hitachi Energy	Member
Foldi	Joseph	Foldi & Associates, Inc.	Guest
Franchitti	Anthony	PECO Energy Company	Member
Frotscher	Rainer	Maschinenfabrik Reinhausen	Guest
Ganser	Robert	Transformer Consulting Services, Co.	Guest
Garcia Wild	Eduardo	Siemens Energy	Guest
Geibel	David	--	Member
Griesacker	Bill	Duquesne Light Co.	Member
Gustavsson	Niklas	Hitachi Energy	Member
Gyore	Attila	M&I Materials Ltd	Member
Hartmann	Thomas	Pepco Holdings Inc.	Guest

Last Name	First Name	Company	Role
Sauls	Roderick	Southern Company Services	Guest
Schindler	Stefan	Maschinenfabrik Reinhausen	Member
Schleismann	Eric	Southern Company Services	Member
Schwartz	Dan	Quality Switch, Inc.	Member
Sen	Cihangir	Duke Energy	Guest
Sewell	Adam	Quality Switch, Inc.	Secretary
Sewell	Jeremy	Quality Switch, Inc.	Member
Sheridan	Peter	SGB USA, Inc.	Guest
Som	Sanjib	Pennsylvania Transformer	Member
Sparling	Brian	Dynamic Ratings, Inc.	Member
Stacy	Fabian	Hitachi Energy	Member
Stank	Markus	Maschinenfabrik Reinhausen	Member
Stechschulte	Kyle	American Electric Power	Member
Steele	Hampton	Tennessee Valley Authority	Guest
Szczechowski	Janusz	Maschinenfabrik Reinhausen	Guest
Tanaka	Troy	Burns & McDonnell	Guest
Tillery	Timothy	Howard Industries	Member
Torabi Goodarzi	Reza	SMIT Transformatoren B.V.	Guest
Van Dreel	Cole	American Transmission Co.	Guest
Varnell	Jason	Doble Engineering Co.	Guest
Vedante	Kiran	Ritz Instrument Transformers	Member
Vijayan	Krishnamurthy	PTI Transformers	Guest
Wagner	Dieter	Hydro One	Guest

Last Name	First Name	Company	Role
Hernandez	Ronald	Doble Engineering Co.	Guest
Jensen	Nicholas	Delta Star Inc.	Guest
John	John	Virginia Transformer Corp.	Guest
Kadar	Laszlo	Hatch	Guest
Kennedy	Gael	GR Kennedy & Associates LLC	Guest
Kleine	Peter	US Army Corps of Engineers	Member
Kraemer	Axel	Maschinenfabrik Reinhausen	Vice-Chair
Lejay	Olivier	Huaming USA Corp.	Member
Millard	Zachary	Great River Energy	Guest

Last Name	First Name	Company	Role
Waldrop	Hugh	Memphis Light, Gas & Water	Member
Washburn	Alan	Burns & McDonnell	Member
Whitehead	William	H2scan Corporation	Member
Whitten	Christopher	Hitachi Energy	Member
Yang	Baitun	R.E. Uptegraff	Guest
Yule	Kipp	Bechtel	Guest
Yun	Joshua	Virginia Transformer Corp.	Member
Zanwar	Anand	Siemens Energy	Member
Zhao	Peter	Hydro One	Member

C57.143 – IEEE Guide for Transformer Monitoring**Monday, November 22, 2021****Virtual Meeting****Minutes of WG Meeting**

The meeting was called to order at 2:20 PM by Chair Mike Spurlock. Secretary Elizabeth Bray (writer of Minutes) was also present. Vice-Chair Poorvi Patel was not present.

There were 70 of 117 members present. There were 60 guests, and 0 guests requesting membership. A membership quorum was achieved. The attendance for this meeting was as follows:

- Number of Members in Activity = 117
- Number of Members Present = 70
- Percentage of Members Present = 60%
- Number of attendees = 130
- Attendees requesting Membership = 0

List of Meeting Attendees is provided below.

Last Name	First Name	Association	
Bargone	Gilles	FISO Technologies Inc.	Member
Bates	Jared	Oncor Electric Delivery	Guest
Benach	Jeff	Megger	Guest
Boettger	William	Boettger Transformer Consulting LLC	Member
Boman	Paul	Hartford Steam Boiler	Member
Bradshaw	Jeremiah	Bureau of Reclamation	Member
Brauer	Stephan	Morgan Schaffer	Member
Bray	Elizabeth	Southern Company Services	Secretary
Buchgeher	Erich	Siemens Energy	Guest
Burde	Jagdish	Virginia Transformer Corp	Guest
Calitz	David	Siemens Energy	Member
Castellanos	Juan	Prolec GE	Guest
Cheim	Luiz	Hitachi Energy	Member
Christodoulou	Larry	Electric Power Systems	Member
Clark	Colin	AltaLink	Guest
Craven	Michael	Phoenix Engineering Services	Guest
Crouse	John	Roswell Alliance	Member
Das	Bhaba	Hitachi Energy	Guest
Dauzat	Thomas	General Electric	Guest
Dent	Brandon	Memphis Light, Gas & Water	Guest
Denzer	Stephanie	Alliant Energy	Member
Doak	Eric	D4EnergySolutions LLC	Guest
Draper	Zachary	Delta-X Research Inc.	Guest
Dukarm	James	Delta-X Research Inc.	Member
Dulac	Hakim	Qualitrol Company LLC	Member
Dutta Roy	Samraghi	Siemens Energy	Guest
Ellis	Wayne	Memphis Light, Gas & Water	Guest
Ermakov	Evgenii	Hitachi Energy	Guest
Espindola	Marco	Hitachi Energy	Member
Fattal	Feras	Manitoba Hydro	Guest

Fazlic	Zlatan	Camlin Power	Member
Fenton	Roger	Fenton Solutions	Member
Field	Norman	Stantec	Guest
Frimpong	George	Hitachi Energy	Member
Gara	Lorne	Shermco	Member
Gardner	James	SPX Transformer Solutions, Inc.	Member
Griesacker	Bill	Duquesne Light Co.	Member
Gross	Detlev	Power Diagnostix Consult GmbH	Member
Guner	Ismail	Hydro-Quebec	Member
Gustavsson	Niklas	Hitachi Energy	Member
Harley	John	FirstPower Group LLC	Member
Hartmann	Thomas	Pepco Holdings Inc.	Member
Hayes	Roger	General Electric	Member
Heiden	Kyle	EATON Corporation	Member
Hernandez	Ronald	Doble Engineering Co.	Guest
Hoffman	Gary	Advanced Power Technologies	Member
Hoffman	Saramma	PPL Electric Utilities	Member
Holland	David	ExxonMobil	Guest
Jarman	Paul	University of Manchester	Member
Kadar	Laszlo	Hatch	Guest
Karas	Jon	SDMyers, LLC.	Member
Katz	Nathan	PacifiCorp	Guest
Kessler	Stacey	TC Energy	Member
Klempner	Dmitriy	Southern California Edison	Member
Kraemer	Axel	Maschinenfabrik Reinhausen	Member
Kulasek	Krzysztof	Hitachi Energy	Member
Kumaria	Deepak	Applied Materials	Guest
Lamontagne	Donald	Arizona Public Service Co.	Member
Larochelle	David	NDB Technologies	Member
Lejay	Olivier	Huaming USA Corp.	Guest
Lopez-Fernandez	Xose	Universidade de Vigo	Member
Mangubat	Darrell	Siemens Energy SAE	Member
Mani	Balakrishnan	Virginia Transformer Corp.	Member
Martin	Terence	MarVen	Member
Martinez	Rogelio	Georgia Transformer	Guest
Mayer	Robert	Siemens Energy	Member
McBride	James	JMX Services, Inc.	Member
McFadden	Matthew	Oncor Electric Delivery	Guest
Miller	Philip	Memphis Light, Gas & Water	Guest
Minhaz	Rashed	Transformer Consulting Services Inc.	Guest
Moleski	Hali	SDMyers, LLC.	Guest
Morales-Cruz	Emilio	Qualitrol Company LLC	Member
Mudryk	Anatoliy	Camlin Power	Member
Munoz Molina	Martin	Orto de Mexico	Member
Naderian	Ali	METSCO Energy Solutions Inc.	Guest
Neeson	Livia	Entergy	Guest
Nunez	Arturo	Mistras Group, Inc.	Member
O'Malley	Anastasia	Consolidated Edison Co. of NY	Member
Panesar	Parminder	Virginia Transformer Corp.	Guest
Patel	Vinay	Consolidated Edison Co. of NY	Guest
Pattabi	Pranav	METSCO Energy Solutions Inc.	Guest

Peterson	Timothy	N. American Substation Services	Guest
Pinard	Matthew	Weidmann Electrical Technology	Guest
Poelma	John	NRG Energy	Guest
Polson	Adam	Arizona Public Service Co.	Guest
Portillo	Alvaro	Ing. Alvaro Portillo	Guest
Portillo	Homero	Advanced Power Technologies	Guest
Pruente	John	SPX Transformer Solutions, Inc.	Member
Rackley	Donnie	RESA Power	Guest
Ray	Jeffrey	JLR Consulting, Inc.	Guest
Reed	Scott	MVA	Member
Rehkopf	Sebastian	Maschinenfabrik Reinhausen	Guest
Reimer	Jonathan	FortisBC	Guest
Richardson	Michael	Ameren	Guest
Robalino	Diego	Megger	Guest
Rocque	Tim	SPX Transformer Solutions, Inc.	Guest
Rodriguez	Josue	Prolec GE	Guest
Roizman	Oleg	IntellPower Pty Ltd	Member
Saad	Mickel	Hitachi Energy	Member
Schindler	Stefan	Maschinenfabrik Reinhausen	Guest
Selvaraj	Pugal	Virginia Transformer Corp.	Guest
Simonov	Igor	Toronto Hydro	Guest
Sinclair	John	PPL Electric Utilities	Member
Soeller	Markus	Power Diagnostix	Guest
Soto	Mauricio	Hitachi Energy	Member
Spoone	Travis	EATON Corporation	Member
Spurlock	Mike	Spurlock Engineering Services, LLC	Chair
Stechschulte	Kyle	American Electric Power	Member
Stretch	Kerwin	Siemens Energy	Guest
Su	Paul	FM Global	Member
Swanson McLeod	Katrina	Southern Nuclear	Guest
Sweetser	Charles	OMICRON electronics Corp USA	Member
Szczechowski	Janusz	Maschinenfabrik Reinhausen	Member
Thompson	James	T&R Service Company	Guest
Thompson	Ryan	Burns & McDonnell	Member
Tostrud	Mark	Dynamic Ratings, Inc.	Member
Trifunoski	Risto	Trench Limited	Guest
Van Der Walt	Alwyn	Electrical Consultants, Inc.	Guest
Veens	Jos	SMIT Transformatoren B.V.	Guest
Wagner	Dieter	Hydro One	Guest
Waldrop	Hugh	Memphis Light, Gas & Water	Member
Walia	Sukhdev	New Energy Power Co.	Member
Warntjes	Michael	American Transmission Co.	Guest
Watson	Joe	JD Watson and Associates Inc.	Member
Welton	Drew	Intellirent	Member
Werelius	Peter	Megger	Guest
Whitehead	William	H2scan Corporation	Member
Williams	Trent	Advanced Power Technologies	Member
Wright	Jeffrey	Duquesne Light Co.	Member
Yazdani	Mana	Trench Limited	Member

The WG plans to meet at the Spring 2022 Meeting.

Agenda

1. Welcome & Introduction
2. Call for Patent Disclosure
3. Chair Remarks
4. Recognition and thanks to volunteers
5. Welcome New Members
6. Quorum Check
7. Approval of Agenda
8. Approval of Spring 2021 Virtual Meeting Meetings
9. Approval of June 28, 2021 Virtual Meeting Minutes
10. Task Force Activities:
 - a. Task Force 1 (Chapters 1,2,3,4) – Trent Williams
 - b. Task Force 2 (5.2 Thermal, 5.3 Cooling, 5.4 Loading) – Poorvi Patel
 - c. Task Force 3 (5.5 LTC, 5.6 Tank, 5.7 Conservator, 5.11 Partial Discharge) – Emilio Morales
 - d. Task Force 4 (5.8 DGA, 5.9 Moisture, 5.10 Bushings, 5.12 GIC) – Bill Whitehead
 - e. Task Force 5 (Chapter 6 Communications) – Zlatan Fazlic
 - f. Task Force 6 (Chapter 7 Cost Benefits) – Elizabeth Bray
 - g. Appendix
11. Status of PAR Extension Request
12. New Business

Chair Mike Spurlock asked if a call for patents disclosure was made and no patent claims were reported. Letters of assurance were received the week before the meeting from two claimants.

Chair Mike Spurlock reviewed the IEEE Copyright policy.

One new member was welcomed into the Working Group, bringing the total members to 117.

Chair Mike Spurlock mentioned the good progress with major revisions to the guide such as section 5.5 – Load Tap Changers, Section 5.8 – Dissolved Gas monitoring, Section 5.9 – Moisture monitoring, Section 5.10 – Bushing monitoring, and Section 5.12 – Geomagnetic Induced Current monitoring. Also, the cut-off for revisions is January 3, 2022. Additional content underway is in the voltage and current section and Jim McBride reported the initial draft of Section 5.13 – On-line Frequency Response monitoring as also been submitted. The goal will be for a ballot Spring 2022.

The Fall 2021 Agenda, Spring 2021 Minutes, and June 28, 2021 minutes were unanimously approved.

Five of the six task force chairs reported status to date.

Task Force 1 - Chair: Trent Williams

Chapter 1 (Overview)

Chapter 2 (Normative References)

Chapter 3 (Definitions)

Chapter 4 (Surveillance Needs)

References definitions are needed to the group.

Task Force 2 - Chair: Poorvi Patel – presented by Mike Spurlock

Clause 5.2 (Thermal)

Clause 5.3 (Cooling)

Clause 5.4 (Load)

Task force in good shape.

Task Force 3 - Chair: Emilio Morales

Clause 5.5 (LTC)
Clause 5.6 (Tank)
Clause 5.7 (Conservator)
Clause 5.11 (Partial Discharge)

Task Force 4 - Chair: Bill Whitehead

Clause 5.10 (Bushings)
Clause 5.8 (Dissolved Gas Analyzers)
Clause 5.9 (Moisture)
Clause 5.12 (Geomagnetic Induced Current)

Task Force 5 - Chair: Zlatan Fazlic Chapter 6 (Communications)

Brian & Zlatan are working on this alone and ask for anyone who would like to volunteer to review please reach out.

Task Force 6 – Chair: Elizabeth Bray Chapter 7 (Cost Benefits)

Requested additional volunteers with utility experience for review the document was requested.

Chair Mike Spurlock stated that the IEEE SA Standards Board approved the PAR extension on May 21,2021. The new PAR expiration date is December 31, 2023.

Progress of the draft C57.143 Guide is on the IEEE Transformer Committee website. Several attendees stated issues with accessing the documents. This has been noted and will be investigated.

The call for any new business brought a motion to initiate a straw ballot after the Guide is ready in January was made by Gary Hoffman and seconded by Drew Welton. The motion passed with unanimous approval.

There was no other new business.

A motion to adjourn was made by Emilio Morales and seconded by Detlev Gross. The motion passed with unanimous approval. The meeting adjourned at 3:15pm.

Meeting Minutes**PC57.107 WG****Recommended Practice for Developing Design Specific Operational Limits for Transformers Connected to Generators or Power Systems Subject to Significant Short-term Changes in Voltage and/or Frequency****Tuesday, November 16, 2021, 12:55-2:10 PM (Central Standard Time)****Joe Watson – Chair, Ramsis Girgis - Vice Chair, Secretary – Drew Welton**

The WG met for the first time on Tuesday, November 16th at 12:55 PM CST. We had 63 attendees. 31 of the attendees requested, and were granted, membership.

A quorum of 100% was in effect since this was our first meeting, but no motions were made or voted on.

No Patent of Copyright issues were raised.

We discussed the project schedule:

- Fall 2021 - Appoint TF's for content and prepare a Draft 1 for Spring 2022
- Spring 2022 – Reports from TF's and prepare a Draft 2 for Fall 2022
- Fall 2022 – Review Draft 2, revise if needed and hold Straw Ballot #1 before Fall 2023 meeting
- Spring 2023 – Revise per Straw Ballot comments, discuss and issue Straw Ballot #2 and resolve any comments
- Fall 2023 – WG approval and send to Power Transformers SC with recommendation to ballot

The WG reviewed Draft 0 which is the Standard Template with the title, scope and purpose added, plus section headers and some text from the work of the V/Hz TF that led to this WG.

The title was discussed with thoughts of revising it for clarity and brevity, but no consensus was reached. We agreed that members could forward recommendations to the Chair and we could discuss them and possibly vote on any recommended changes at the next meeting. This would require a PAR revision.

Draft 0 has a Section 4.2 titled Causes of short term overexcitation of power transformers, and a Section 4.4 titled Relay practices. A TF was formed to prepare text for these two sections. The TF members are:

- Drew Weldon
- Kipp Yule
- Bruce Webb
- Ryan Hogg

Draft 0 also has a Section 4.4 titled Existing short term overexcitation curves. We decided to move this section to an Annex and add a brief paragraph on the subject to Section 4.1. Ramsis Girgis agreed to write this text.

Draft 0 also has a Section 6 titled Recommended short time temperature limits for metallic parts and insulating materials. While all insulating materials have thermal ratings, these are typically for continuous conditions and not for short-time durations in the 10's of seconds, where higher temperatures may not deteriorate the materials. We discussed the need to develop a philosophy on the temperature limits for oil and insulating materials and how they will affect the V/Hz curves for each transformer. The general consensus was that the V/Hz curves should document the operating conditions that would cause no damage or accelerated loss-of-life to insulation or other parts of the transformer. The Committee has other Subcommittees and WG's that have done extensive work in these areas and we need to be consistent with these other groups. A TF was created to develop the philosophy and to reach out to other groups for guidance. The TF members are:

- Joe Watson
- Jagdish Burde
- Sanjay Patel

Additional sections of the document will be developed after these sections have been drafted, including the Definitions, Acronyms, References and Section 4.2 currently titled Impact of short term overexcitation on power transformers.

The Chair agreed to send out Draft 0 to all of the attendees once the attendance is entered into AMS. We will also post Draft 0 on the Transformer Committee website under the Power Transformers page.

We will meet again in Spring 2022, and if we meet in-person we should have a room that will hold approximately 75 people.

The meeting adjourned on-time at 2:10PM.

The attendees are listed below.

Status	Name	Affiliation
Member	Amitabh Sarkar	VA Transformer
Guest	Anton Koshel	Delta-Star
Member	Antonio Ceballos	Georgia Transformer
Guest	Axel Kraemer	Reinhausen
Member	Balakrishnan Mani	VA Transformer
Member	Bruce Webb KUB	Knoxville Utiities Board
Member	David Murray	Tennessee Valley Authority
Guest	David Walker	MGM Transformers
Guest	Deepak Kumaria	Applied Materials
Secretary	Drew Welton	Intellirent
Member	Ed teNyenhuis	Hitachi Powergrids
Member	Eduardo Garcia	Siemens Energy
Guest	Eduardo Tolcachir	TTE
Member	Egon Kirchenmayer	Siemens Energy
Guest	Emilio Morales-Cruz	Qualitrol
Guest	Fabian "Durand" Stacy	Hitachi Energy
Member	Huan Dinh	Hitachi Energy
Guest	Ion Radu	Hitachi Energy
Member	Jagdish Burde	VA Transformer
Guest	Jeff Gragert	XCEL Energy
Guest	Jeff Ray	JLR Consulting
Guest	Jeffrey Wright	Duquesne Light
Chair	Joe Watson	JD Watson and Associates
Member	John K John	VA Transformer
Guest	JOHN POELMA	NRG
Guest	Jos Veens	SGB-Smit
Guest	Juan Alfredo Carrizales Baaldua	Prolec/GE
Member	Juan Carlos Cruz Valdes	Prolec/GE
Guest	Kannan Veeran, GA Transformer	Georgia Transformer
Member	Kayland Adams SPX Transformers	SPX
Member	Kipp Yule	Bechtel
Member	Kiran Vedante	Ritz Instrument Transformers
Guest	Larry Dix	Quality Switch
Member	László Kádár	Hatch
Guest	Livia Neeson	Entergy
Guest	Lorne Gara	Shermco
Guest	Mana Yazdani	Trench
Guest	Martin Muñoz	Orto
Member	Mats Bernesjo	Hitachi Powergrids
Guest	Mcfadden, Matthew	Oncor
Guest	Muhammad Ali Masood Cheema	Northern Transformer
Member	Nicholas Jensen - Delta Star	Delta-Star
Guest	Olle Benzler	Megger
Guest	Orlando Giraldo	H-J
Member	Peter Kleine	US Army Corps of Engineers
Co-Chair	Ramsis Girgis	Hitachi Energy
Member	Reza Torabi	SGB-Smit

Member	Richard von Gemmingen	Dominion Energy
Guest	Rob Ghosh	Power System Asset Mgmt Solutions
Guest	Rodrigo Ocon	Condumex
Guest	Roger Hayes	GE
Member	Ronnie Minhaz	TC Services
Member	Ryan Hogg	Bureau of Reclamation
Member	Sanjay Y. Patel	Royal Smit Transformers
Guest	Stefan Schindler	Reinhausen
Member	Sudip Chanda	VA Transformer
Member	Suleman Khan	OPG
Guest	Suresh Babanna	SPX
Guest	Taylor Gray	PG&E
Member	Thomas Hartmann	Pepco Holdings
Member	Waldemar Ziomek	PTI Transformers
Guest	William Boettger	Boettget Transformer Consulting
Guest	XOSE M LOPEZ-FERNANDEZ	Universidade de Vigo

Working Group for Condition Assessment Guide
PC57.170
Tuesday, November 16, 2021
08:00 – 9:15 AM
Virtual Meeting

Acting Chairman: James Cross (interim, replacing Kumar Mani)
Vice Chair: James Cross
Acting Secretary: Alan Sbravati (interim, replacing Akash Joshi)

The meeting was called to order at 8:00 am CST by Chair.

There were 38 of 84 voting members present. There were 53 guests. A membership quorum was not achieved.

Attendance list:

Jams Cross - Acting Chair
Alan Sbravati - Acting Secretary

AGENDA

- A. Welcome & Introduction
- B. Attendance and Establishment of Quorum- the meeting attendance will be recorded by the Online Conference Call Coordinator.
- C. Call for Patent Disclosure
- D. IEEE Copyright Policy
- E. Approval of Spring 2021 Minutes
- F. Working Group Activities
 1. Task Force 1 Presentation by Luiz Cheim
 2. Task Force 2 Presentation by Saramma Hoffman
 3. Task Force 3 Presentation by Jonathan Sinclair
 4. Task Force 4 Presentation by Alan Sbravati
- G. Discussion on individual Task Force presentations will be held at the end of all presentations.
- H. Other Items
- I. Adjournment

The agenda of the meeting was presented by the chair.
Chairman posted the Patent Claim. No claims were made.
Chairman presented the copyright policy slides.

Call of members was performed twice as there seemed to be confusion about the alphabetical member listing on the PPT and quorum was not achieved. (Note: For future meetings the member list should be in alphabetical order by LAST name, spread over as many slides as necessary.)

Several attendees requested membership in the WG (recorded in the meeting chat).

Presentations of the task force activities

TF 1 – Luiz Cheim

- The task force has been working mostly on chapter one, starting chapter 2 now.
- Great participation and attendance to the conference calls, but two sub-task force leaders are missing.
- Members of other task forces may volunteer to be a sub-task force leader. Some names were presented in the chat and will be contacted by the TF leader.
- The current draft was briefly presented.

TF 2 – Saramma Hoffmann

- The task force has been working mostly on chapters 3, 4 and 5.
- Great participation and attendance to the conference calls.
- Requesting additional contributors, for the chapters are quite long.

- Highlighted the several interface points between chapter 5, covering the failure modes for core and coils and chapter 9, for insulating liquid.

TF 3 – John Sinclair

- The task force has been working mostly on chapters 6, 7 and 8.
- Great participation and attendance to the conference calls.
- Did relevant progress, but missing experts in specific topics, such as cable boxes.

TF 4 – Alan Sbravati

- The task force has been working mostly on chapters 9 and Annexes A and B.
- The Annex A will not be included, as the reference for limits is the IEEE C57.166
- Annex B was transferred to TF 1.
- Great participation and attendance to the conference calls, allowing the chapter on insulating liquids to be concluded.
- Main topics in this chapter are the failure modes of the insulating liquid, not the situations where the liquid works as a message transmitter.
- Comments from the WG were requested.
- The chapter will be a reference to IEEE Std. 637, for the sake of avoiding repetition.
- TF was discontinued

TF 5 – Stephanie Denzer

- All current drafts were combined in a single document.
- This is not yet a “first draft”. It is being called a pre-draft.

Additional discussions:

- Transformer criticality is an important topic. Toby offered to help with his experience
- The analysis cannot include dollar figures, economic assessment. Suggestion to use letters instead of monetary values in the examples.
- The Cigre document proposed the use of 6 statuses, being 1-5 for different levels of degradation and 6 the trigger for de-energizing as soon as possible. Colors and letters are associated with each level.
- Different suggestions were presented:
 - o Using numbers for differentiation
 - o Reducing the categories from 5+1 to only 3
- There are different strategies for combining the individual assessment results into a single health index. This is the content of the Annex B of the Cigre brochure, which is now incorporated in the TF 1.

- Being this a guide, it should not indicate a method to be used. Presenting pros / cons of the different methodologies is a very important aspect.

New Business: No new business.

The transformer committee chair congratulated the group for being able to put together this document in such a short period of time.

The meeting was adjourned at 9:12 am CST.

Alan Sbravati, Interim Secretary
James Cross, Vice Chair / Interim Chair

ATTENDANCE ROSTER

First Name	Last Name		Affiliation	Request Membership
Javier	Arteaga		Hitachi Energy	
Suresh	Babanna		SPX transformers	X
Barry	Beaster		The H-J Family of Companies	
Enrique	Betancourt		Prolec GE	X
William	Boettger		Boettger Transformer Consulting LLC	
Paul	Boman		Hartford Steam Boiler	
Jeremiah	Bradshaw			
Jagdish	Burde		Virginia Transformer Corp.	X
Luiz	Cheim		Hitachi Energy	
James	Cross		Kinectrics Inc.	
Eric	Davis		Burns & McDonnell	
Stephanie	Denzer		Alliant Energy	
Eric	Doak		D4EnergySolutions	
Hakim	Dulac		Qualitrol	
Wayne	Ellis		Memphis Light, Gas and Water	

Evgenii	Ermakov		Hitachi Energy	
Marco	Espindola		Hitachi Energy	X
Roger	Fenton		Fenton Solutions	
Norman	Field		Stantec	
Bruce	Forsyth		Bruce Forsyth and Associates PLLC	
Eduardo	Garcia		Siemens Energy	
James	Graham		Weidmann Electrical Technology	
Bill	Griesacker		Duquesne Light	
Ismail	Guner		Hydro Quebec	X
Niklas	Gustavsson		Hitachi Energy, Sweden	X
Attila	Gyore		M&I Materials	
Thomas	Hartmann		Pepco Holdings Inc	
Saramma	Hoffman		PPL	
Paul	Jarman		University of Manchester	
Toby	Johnson		Hunt Electric	
Jon	Karas		SDMyers	
Gael	Kennedy		GR Kennedy & Associates LLC	
Peter	Kleine		U.S. Army Corps of Engineers	
Axel	Kraemer		Reinhausen Germany	
Alexander	Kraetge		OMICRON, Germany	
John	Lackey		PowerNex Associates Inc.	
Don	Lamontagne		Arizona Public Service	
Weijun	Li		Braintree Electric Light Department	X
Jinesh	Malde		M&I Materials	
Robert	Mayer		Siemens-Energy	
Emilio	Morales Cruz		Qualitrol	
David	Murray		TVA	
Tim	Peterson		Nomos Systems / North American Substation Services	
Patrick	Picher		Hydro-Québec	
Matt	Pinard		Weidmann Electrical Technology Inc.	
Paulette Payne	Powell			
Tim	Raymond		EPRI	
Scott	Reed		MVA	

Oleg	Roizman			X
Samraghi Dutta	Roy		Siemens Energy	
Mickel	Saad		Hitachi Energy	
Amitabh	Sarkar		Virginia Transformer Corp.	
Alan	Sbravati		Cargill	
Ewald	Schweiger		Siemens Energy	
Devki	Sharma		Entergy	
Hemchandra	Shertukde		University of Hartford	
Jonathan	Sinclair		PPL Electric Utilities	X
Mauricio	Soto		Hitachi Energy	X
Brad	Staley		Salt River Project	
Janusz	Szczechowski		Maschinenfabrik Reinhausen GmbH, Germany	
Troy	Tanaka		Burns & McDonnell	
Marc	Taylor		JFE Shoji Canada	
Ed	teNyenhuis		Hitachi Energy	
Jason	Varnell		Doble Engineering	X
Rogério	Verdolin		Verdolin Solutions Inc.	
Richard	von Gemmingen		Dominion Energy	
Sukhdev	Walia		New Energy Power LLC	
Alan	Washburn		Burns & McDonnell	
Joe	Watson		JD Watson and Associates	
Drew	Welton		Intellirent	
William "Bill"	Whitehead		H2scan	
Trenton	Williams		Advanced Power Technologies	
Jeffrey	Wright		Duquesne Light	

MEETING MINUTES

IEEE PES TRANSFORMERS COMMITTEE
Working Group for Revision of C57.116
IEEE Guide for Transformers Directly Connected to Generators

Chair: Weijun Li, Vice-Chair: Jason Varnell, Secretary: Bill Griesacker

The working group met on Monday 11/15/2021 at 10:50 a.m. via Webex. A total of 66 attendees participated in the meeting. 19 out of 26 working group members were in attendance, therefore a quorum was achieved. The complete attendance record is included in these minutes and is also available in the AM System. 4 attendees requested membership which was granted after checking attendance records.

The chair presented the IEEE prepared patent slides and requested any essential patents or patent claims to be made known. There was no response from the meeting participants.

The chair presented the IEEE prepared copyright slides.

The chair discussed the PAR timeline. The PAR was approved on 11/7/2019 and is valid until the end of 2023.

The meeting agenda was approved by unanimous consent. The meeting minutes from the previous meeting held on April 26, 2021 were also approved by unanimous consent.

Task Force reports:

Task Force #1 (sections 3, 4, 5, 9, 10, 11) – Shankar Nambi, Chair:

Since presenting the initial proposed changes at the Spring 2021 meeting, the TF has suggested 2 additional changes: adding C57.19.04 to Section 2 as a reference and updating the new paragraph in Section 11. A motion to accept the proposed changes was made by Toby Johnson and seconded by John K. John. The motion was approved by unanimous consent.

Task Force #2 (section 6) – Toby Johnson, Chair:

The TF chair reviewed the proposed changes to the document, most of the changes were made for clarification purposes. It was noted that a few clarifications are still needed. One focus is to review a

recommendation by Jason Varnell regarding the wording for voltage ratings in Subclause 6.3.1. The reference to “risk” will be addressed, to be in line with IEEE preference.

Task Force #3 (sections 7, 8) – Kayland Adams, Chair:

The changes to the document were reviewed. A motion to accept the proposed changes was made by Kayland Adams and seconded by Toby Johnson. The motion was approved by unanimous consent.

Task Force #4 (new Annex A – Considerations for Specifying GSUs):

The new annex was reviewed by the working group. A motion to accept the new annex was made by Suresh Babanna and seconded by Joe Watson. The motion was approved by unanimous consent.

Task Force #5 (new Annex B – V/Hz) – Joe Watson, Chair:

The new annex was reviewed by the working group. Figure 1 in the new annex will become new Figure B.1. A motion to accept the new annex was made by Suresh Babanna and seconded by Joe Watson. The motion was approved by unanimous consent.

Updates to Figures 1, 7, 17, 18:

The updated figures were reviewed by the working group. A motion to accept the updated figures was made by Suresh Babanna and seconded by Toby Johnson. The motion was approved by unanimous consent.

New Business:

A comment by Han-Min Park at Korea Electric concerning a discrepancy between Figure 13(b) and its wording was reviewed and resolved during the task force report by TF2

Recommendations by Jason Varnell regarding wording in subclauses 6.3.1 and 6.3.5: Recommended change to 6.3.5 has been incorporated in the new draft; TF2 and Jason Varnell will work together to update 6.3.1.

[B16] Operating Characteristics of Salient-Pole Machines has been added to Annex C.

The meeting was adjourned at 12:05 p.m. The group will meet next in Denver, Colorado in March 2022.

Attendance:

Role	First Name	Last Name	Company
Member	Kayland	Adams	SPX Transformer Solutions, Inc.
Member	Suresh	Babanna	SPX Transformer Solutions, Inc.
Guest	Gilles	Bargone	FISO Technologies Inc.

Guest	Mats	Bernesjo	Hitachi Energy
Guest	Enrique	Betancourt	Prolec GE
Guest	William	Boettger	Boettger Transformer Consulting LLC
Guest	Jeremiah	Bradshaw	Bureau of Reclamation
Guest	Jagdish	Burde	Virginia Transformer Corp
Guest	Arup	Chakraborty	Delta Star Inc.
Guest	Sudip	Chanda	Virginia Transformer Corp.
Guest	Muhammad Ali Masood	Cheema	Northern Transformer
Guest	Everton	De Oliveira	Siemens Energy
Guest	Thomas	Eagle	SPX Transformer Solutions, Inc.
Guest	Evgenii	Ermakov	Hitachi Energy
Guest	Edmund	Feloni	CEG Forensics LLC
Guest	Robert	Ganser	Transformer Consulting Services, Co.
Guest	Eduardo	Garcia Wild	Siemens Energy
Member	Rob	Ghosh	General Electric
Guest	Ramsis	Girgis	Hitachi Energy
Secretary	Bill	Griesacker	Duquesne Light Co.
Guest	Roger	Hayes	General Electric
Member	Ryan	Hogg	Bureau of Reclamation
Guest	Nicholas	Jensen	Delta Star Inc.
Member	John	John	Virginia Transformer Corp.
Member	Toby	Johnson	Hunt Electric
Guest	Laszlo	Kadar	Hatch
Member	Suleman	Khan	Ontario Power Generation
Guest	Krzysztof	Kulasek	Hitachi Energy
Member	John	Lackey	PowerNex Associates Inc.
Guest	Donald	Lamontagne	Arizona Public Service Co.
Chair	Weijun	Li	Braintree Electric Light Dept.
Guest	Xose	Lopez-Fernandez	Universidade de Vigo
Guest	Balakrishnan	Mani	Virginia Transformer Corp.
Guest	Robert	Mayer	Siemens Energy
Guest	James	Mciver	Siemens Energy
Member	Vinay	Mehrotra	SPX Transformer Solutions, Inc.
Guest	Rashed	Minhaz	Transformer Consulting Services Inc.

Member	Emilio	Morales-Cruz	Qualitrol Company LLC
Member	Shankar	Nambi	Bechtel
Guest	Livia	Neeson	Entergy
Guest	Sanjay	Patel	Smit Transformer
Guest	John	Poelma	NRG Energy
Guest	Adam	Polson	Arizona Public Service Co.
Guest	Michael	Richardson	Ameren
Guest	Tim	Rocque	SPX Transformer Solutions, Inc.
Member	Dinesh	Sankarakurup	Duke Energy
Guest	Amitabh	Sarkar	Virginia Transformer Corp.
Guest	Anil	Sawant	Virginia Transformer Corp.
Member	Steven	Schappell	SPX Transformer Solutions, Inc.
Guest	Ewald	Schweiger	Siemens Energy
Guest	Kenneth	Skinger	Scituate Consulting, Inc.
Guest	Ed	teNyenhuis	Hitachi Energy
Guest	Michael	Thibault	Pacific Gas & Electric
Guest	Ryan	Thompson	Burns & McDonnell
Guest	Eduardo	Tolcachir	Tubos Trans Electric S.A.
Guest	Reza	Torabi Goodarzi	SMIT Transformatoren B.V.
Guest	Mark	Tostrud	Dynamic Ratings, Inc.
Vice-Chair	Jason	Varnell	Doble Engineering Co.
Guest	Jos	Veens	SMIT Transformatoren B.V.
Guest	Krishnamurthy	Vijayan	PTI Transformers
Guest	Sukhdev	Walia	New Energy Power Co.
Member	Joe	Watson	JD Watson and Associates Inc.
Member	Drew	Welton	Intellirent
Guest	William	Whitehead	H2scan Corporation
Member	Kipp	Yule	Bechtel
Guest	Waldemar	Ziomek	PTI Transformers

**PAR Study Group for PC57.135 -
IEEE Guide for the Application, Specification, and Testing of Phase-Shifting Transformers**

After the exchange via emails we held our virtual meeting on Wednesday Nov 10, 2021 starting at 2:00PM (EST). This was the first virtual meeting as a PAR Study group.

9 of 16 Members were present. A quorum was met with 9 members present.

Ahuja	Raj	Raj Ahuja Consulting
Avanoma	Onome	MJ Consulting
Aymen Lpizra	Aymen Lpizra	Eversource
Burde	Jagdish	Virginia Transformer Corporation
Feghali	Pierre	NASS
Jarman	Paul	University of Manchester
Juchem	Kevin	Hitachi ABB
Kraemer	Axel	Maschinenfabrik Reinhausen GmbH
Patel	Sanjay	TD-Smit Transformers
Portillo	Álvaro	
Schrammel	Alfons	Siemens Energy
Stechschulte	Kyle D	AEP
Thompson	Michael	SEL Engineering Services, Inc.
Veens	Jos A.M.	Royal SMIT Transformers B.V.
Welton	Drew	Intellirent
	Ewald	Siemens Energy

[9 members of Total 16 Members participated in the virtual meeting](#)

The patent slides and the copyright policy had been provided by email before the meeting. A reminder of these slides was given and a call for patents was made, with no response.

Before the virtual meeting took place the group has been asked to provide their feedback about

- After the review of the document should C57.135 be revised?
- Based on your answer above - Please state any further comment why we should or should not revise C57.135

All responses indicated that C57.135 should be revised.

Major topics are (examples):

IEC/IEEE 60076-57-1202:

i.e. It needs review in the context of IEC/IEEE 60076-57-1202 to remove duplication and update

Correct errors, revision, improvements:

i.e. Figure 11, Table 1, Clause 4.7.2 a, Clause 5.1 a

Requests from PSRC WG K1, C37.245:

i.e. harmonization, request for clarification, protective relay application should be removed

Further there is the request from the group, that the work should be offered to IEC TC14 as a joint project

Members mentioned that previously there was the agreement made with IEC that and a revision of C57.135 has to be done with the involvement of IEC TC14.

Based on the discussions took place during the virtual meeting the next steps have been discussed and therefore a voting email was sent out after the meeting – The response was requested asap but not later than Sunday, November 14th.

There was no additional new business and the meeting was adjourned at 2:24PM (EST).

The attached presentation was used during the meeting and amended (after the meeting) in order to include the information received just before the meeting took place and updated accordingly (to be seen as MoM).

After the virtual meeting:

13 emails have been received, and all these 13 members answered the question:

Should we as the PAR Study Group report back to the Power Transformers Subcommittee (PTSC) with a recommendation to form a working group to revise the document? with YES

3 Members did not response within the given timeline.

We achieved a quorum of 81%

Therefore we report back to the Power Transformers Subcommittee (PTSC) that the PAR Study Group recommends to form a working group to revise the document PC57.135 - IEEE Guide for the Application, Specification, and Testing of Phase-Shifting Transformers

Ewald Schweiger
Chair of PAR Study Group

November 15th, 2021