Annex H Insulation Life Subcommittee

October 30, 2024
St. Louis, Missouri

Chair: Sam Sharpless
Vice-Chair: Jinesh Malde
Secretary: Anastasia O'Malley

The Insulation Life Subcommittee (ILSC) was called to order by the Chair on October 30, 2024, at 8:00 am CDT. The Chair reviewed the agenda and then introduced the subcommittee officers. Due to the size of the group, general introductions were not made. The Chair requested that each person state their name and affiliation when addressing the subcommittee. The list of subcommittee members was displayed, and attendees scanned a QR code to record their attendance. One attendance roster was also used for attendees who were note able to not scan the QR code.

H.1 Chair's Report/Remarks

The Chair emphasized the timely completion, technical accuracy, and usefulness of quality projects through the participation of working group leaders, subject matter experts and the general membership.

The Chair reviewed the requirement for activity leaders to maintain updated documents on the subcommittee webpage. He also reviewed administrative requirements for task force and working group chairs. The Chair showed the essential patent claim notice and requested that any person with knowledge of an essential patent that meets the requirements of any subcommittee standard to bring the issue forward for discussion. No essential patent claims were raised.

The Chair reviewed guidelines for IEEE working group meetings reminding compliance with all applicable laws, including antitrust and competition laws.

The Chair displayed the copyright policy and advised the subcommittee that permission would be required from the authors or organizations for use of information.

The Chair discussed the membership requirements, welcomed new members:

Sami Debass
Gabriel Delgado Zamora
Jeffrey Door
Alireza Gorzin
Philip Hopkinson
Jose Luis Manchain
Ismael Naja
Parminder Panesar
Miguel Plascencia
Dominic Pollaro
Rodrigo Ronchi
Jaber Shalabi
YongTae Sohn
Mauricio Soto
Fabian Stacy
Kyle Stechshulte
Matthew Sze
Scott Thomas
Alwyn Vanderwalt
Richard VonGemmingem
Mike Waldrop
Matt Weisensee
Guang Yuan

And reviewed members moved to guest status:

Arup Chakrabotry
Carlos Gaytan
Stephen Jordan
Gael Kennedy
Mario Locarno
Markus Schiessel
Jeffrey Schneider
Pugal Selvaraj
Krishnamurthy Vijayan

H.2 Secretary's Report

For the Fall 2024 St. Louis meeting a QR scan code was used for attendance polling and recording. The QR code was supplemented with an attendance roster. The QR scan code indicated that a quorum had been achieved with 92 out of 133 members in attendance. The attendance roster added 3 additional members for a total of 95 out of 133 members present in the meeting together with 90 guests. A quorum had been achieved. Participants requesting membership for the subcommittee were advised to reach out to the Chair, Vice-Chair or Secretary at the conference, through email or to note it on the paper roster. Nineteen guests requested membership. A list of attendees is provided at the end of this report.

The Spring 2024 subcommittee meeting minutes had been provided to participants in advance of the meeting for review.

Sanjib Som made a motion to approve the minutes. Amitabh Sarkar seconded the motion. After hearing no objection from the attendees, the Spring 2024 meeting minutes were approved by unanimous consent.

The agenda for the meeting had been provided to participants in advance of the meeting for review. An updated agenda with one change highlighted was displayed. Rogerio Verdolin moved for approval of the agenda as shown. Eduardo Garcia seconded the approval of the agenda. After hearing no objection from the attendees, the meeting agenda was approved by unanimous consent.

H.3 Taskforce Reports

H.3.1 Task Force C57.12.90 Clause 11, Temperature Rise Tests – Dinesh Sankarakurup, TF Chair presented the meeting minutes

ILFC TF Continuous Revisions to IEEE C57.12.90 Clause 11

Temperature-rise Tests

October 29th, 2024, St Louis, MO

TF - Temperature-rise Tests		
Chair: Dinesh Sankarakurup	**Vice-Chair: Ajith M. Varghese**	**Secretary: Cihangir John Sen**
Room: Grand Ballroom E	Date: October 29th, 2024	Time: 3:15 pm to 4:30 pm
Total TF Members: 27	Members present at the Quorum: 17	Attendance Per Roster: 54
Guests present: 31 (Table-2)	Membership requested: 15	Granted membership: 6
Status changed to Guest: 3		Final TF Members: **30** (Table-1)

Chair's Remarks

The meeting was called to order at 3:15 PM on October 29, 2024. The Chair welcomed members and guests to the Fall 2024 meeting.

Attendance rosters were circulated. There were 54 participants present (including the Chair, Vice Chair, and the Secretary) and 15 participants requested voting membership. Six (6) of the 15 requests were granted according to their participation records. 3 members' statuses have changed to guest.

Per the Working Group Policies and Procedures, voting membership status will be effective as of the start of the next meeting in Spring 2025. Table 1 is the final list of the **30 members** of this TF. Table 2 lists the 31 guests present at the Fall 2024 meeting.

Table-1: Final Membership List (after F24 Meeting)

	First Name	Last Name		First Name	Last Name
1	Steve	Antosz (P)	**16**	Bertrand	Poulin (P)
2	Gilles	Bargone	**17**	Jarrod	Prince
3	William	Boettger	**18**	Juan	Reyes Perez (New) (P)
4	Juan	Castellanos (P)	**19**	Dinesh	Sankarakurup (P)
5	Luc	Dorpmanns (New) (P)	**20**	Ewald	Schweiger
6	Samragni	Dutta Roy	**21**	Cihangir John	Sen (P)
7	Renjie	Fu (New) (P)	**22**	Abdulmajid	Shaikh (P)
8	Saramma	Hoffman	**23**	Michael	Shannon (P)
9	Qasim	Khan (P)	**24**	Sam	Sharpless (P)
10	Zan	Kiparizoski (P)	**25**	Sanjib	Som (P)
11	Egon	Kirchenmayer (P)	**26**	Valeriu	Tatu (P)
12	Fernando	Leal (P)	**27**	Ryan	Thomson (New) (P)
13	Gabriel	Mamede	**28**	Ajith	Varghese (P)
14	Francis	Mills (New) (P)	**29**	Jason	Varnell (P)
15	Marta	Munoz (New) (P)	**30**	David	Wallach (P)

(P) Members Present, (N) New Member

.**Table-2: Guests present during F24 WG Meeting**

	First Name	Last Name		First Name	Last Name
1	Donald	Ayers	**17**	Moses	Manzano
2	Hugo	Bayena	**18**	Joe	Nims
3	Duvier	Bedoya	**19**	Anastasia	O'Malley
4	Edwin	Betancourt	**20**	Manan	Pandya
5	Josh	Bohrn	**21**	Dean	Park
6	Michael	Botti	**22**	Sylvain	Plante
7	Mark	Finn	**23**	Ulf	Radbrandt
8	Joseph	Foldi	**24**	Garret	Sarkinen
9	Sergio	Hernández Cano	**25**	Samuel	Tekle
10	Thomas	Holifield	**26**	Scott	Thomas
11	Fawaz	Iqbal	**27**	John	Wagner
12	Marion	Jarosewski	**28**	Luke	Wang
13	Sheldon	Kennedy	**29**	Matthew	Weisensee
14	Evan	Knapp	**30**	Paul	Weyandt

15	Arvind	Kumar	**31**	Joseph	Youn
16	Luc	Loisellez			

Quorum, Approval of Minutes and Agenda

At the time of quorum 17 of the 27 members were present so quorum was achieved short after the meeting start. The Unapproved minutes from the Spring 2024 in Vancouver meeting was presented by Chair and approved by the WG. Chair clarified that the online meeting minutes are not included upon a question by Sam Sharpless.

The agenda for Fall 2024 meeting with the Spring 2024 meeting minutes were unanimously approved.

Patents and Copyrights

Chair made the call for the patent and shared the IEEE SA slides on patent policy and copyright. The attendees were asked if there were any Patents and Copyrights relevant to the scope that the TF should be aware of. None were reported

TF started to discuss about the old businesses since quorum was achieved.

Old/ Unfinished Businesses:

1) Hot spot rise calculation for OFAF /OFWF cooler transformer

TF continued to discuss the proposed changes by Bertrand Poulin and the comments from the circulation of these changes within the TF. Below comments were received after the last circulation of the proposed section 11.3.2.

1.a - Addition of natural convection cooling methods with natural esters that have higher flash points that was proposed by Jason Varnell.

As per David Wallach's suggestion, it was agreed to modify the paragraph as

"For transformers with natural convection of liquid flow through the cooling equipment and in windings (e.g., ONAN, KNAN, LNAN etc.), the following simplified oil flow pattern is assumed."

Also, "ONAN/ONAF transformers" is changed to "transformers with natural convection" under Figure 1.

1.b – TF agreed to include the below sentence under Figure-1 that shows the oil flow pattern for transformers with natural convection:

"The liquid flow pattern described above for natural convection transformers (Figure 1) is applicable to both guided and non-guided liquid flow."

1.c - ODAF and ODWF is changed to "transformers with forced circulation through cooling equipment and directed from the cooling equipment into at least the main windings (directed flow)" in the paragraph.

Also, Figure-2 definition is changed to "Oil flow pattern for transformers with directed flow (OD)"

1.d – The paragraph that describes the Figure-2 is changed as below to make it clear and more accurate according to the operating principal of the directed oil flow:

"A pump is used to force the oil through the heat exchangers (radiators or coolers) and directed into the windings with only a small portion going to the core."

1.e - In accordance with the above changes, ONAN/ONAF, ODAF and ODWF in Figure-3 definition is changed to "transformers with natural convection and directed oil flow".

Also, the "OFAF/OFWF transformers" that are represented in Figure-4 are revised as "transformers with forced circulation through the cooling equipment and natural convection flow in the windings (non-directed flow)"

1.f - In 11.3.5.3, the cooling methods ONAN/ONAF, ODAF and ODWF excludes the other fluid types such as KNAN/KNAF,etc. It will be revised to take into consideration of the different fluid types.

Addition to the above changes, there were several editorial changes that were implemented in the section with the agreement of the TF attendees.

Chair suggested to survey the revised clause 11.3.2 within the Task Force after implementing the all the changes discussed during the Fall 2024.

2) Negative Altitude Correction (Transformers tested at factories located > 1000 m)

The revised section 11.4.3 regarding the altitude correction was surveyed one time and received a 90% approval rate already.

Steve Antosz provided an update and informed the TF that the section is now final and ready for sending out for a survey within the Task Force. He made a motion to survey the final clean version. Jason Varnell seconded. It will be sent for the final survey before the Spring 2025 meeting. No further discussion.

3) Tap Selection for Temp Rise Test:

TF didn't have time to discuss on this item, however Joseph Foldi wanted to present his thoughts about the tap selection during the temperature rise test and requested to be considered as a new business. His comments were about the below item 4 under clause 11.4. He proposed to change the requirement of testing on a bridging position to an extreme non-bridging position (16L/16R).

4. Transformers with preventive autotransformers (PA) - The tap-changer shall be in a bridging position (not applicable when the preventive autotransformer is energized only during transition), with all or a significant portion of the LTC circuit carrying current. (Example: Test on LTC Tap 15R/15L instead of Tap N, 1R/1L or 16R/16L).

TF did not have time to discuss the proposed change so it was requested from Joseph Foldi to provide an email for the TF to include the discussion in the next meeting's agenda.

No new business was identified.

Meeting was adjourned at 4:33pm.

Minutes respectfully submitted by,

Cihangir John Sen
Secretary

H.4 Technical Activity Reports:

H.4.1 WG IEEE 1276a IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid Immersed Distribution, Power and Regulating Transformers, Amend Annex B and D – Kevin Biggie WG Chair presented meeting minutes

WG IEEE 1276a, Amend Annexes B&D – Meeting Minutes

IEEE 1276 IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Distribution, Power, and Regulating Transformers

Monday, 28 October 2024, 11:00 am – 12:15 pm CDT – Fall 2024 (in-person meeting)

- Chairman: Kevin Biggie (Weidmann)
- Vice-chair: George Frimpong (retired – not present)
- Secretary: Evanne Wang (DuPont)

The Chair called the meeting to order at 11:03 am CDT and welcomed attendees to the meeting. A quorum was achieved. The breakdown of attendees is shown below:

- Attendees present: Eighty-nine (89)
- Members present: Nineteen (19) (19 required for quorum)
- Guests requesting membership: Not applicable
- Guests granted membership: Not applicable

Meeting guidelines, essential patent claims information, and copyright information were reviewed. No patent claims or copyright issues were brought to attention.

The Chair reviewed the purpose of the Working Group, which is to amend annexes B & D of IEEE 1276.

The minutes from the last meeting on March 11th, 2024 were reviewed an unanimously approved. This was motioned by Ed Casserly (Ergon) and seconded by Mike Shannon (REA Magnet Wire). The Chair presented the proposed agenda for this meeting, which was unanimously approved. This was motioned by Phil Hopkinson (HVolt) and seconded by Chao Li (Eaton). Both unapproved minutes from the last meeting and the proposed agenda were sent prior to tine in-person meeting to the members and guests of this Working Group.

The Chair reviewed the progress made since the last WG meeting, including changes to develop Draft D.6 of the document, and the results of the emailed straw ballot results for Draft D.6, which was 28 counts for “approve” and 1 count for “abstain.” The 28 approvals of the 37 voting members (75%) met the two-thirds super majority required for Draft D.6 to be presented for approval to proceed to IEEE SA Sponsor Ballot at the upcoming Insulation Life Subcommittee meeting. The Chair asked for any further comments and none were received.

The Chair noted that he will be making a motion at the ILSC to move Draft D.6 to ballot, and seeks members for a comment resolution group (CRG). The volunteers for the CRG are as follows:

1. Jinesh Malde (M&I Materials)
2. Chao Li (Eaton)
3. Ed Casserly (Ergon)
4. Tim Raymond (Inductive Reasoning)
5. Stu Chambers (EPRI)
6. Pragnesh Vyas (Sunbelt Solomon)

7. Bruce Forsyth (Cargill)
8. Kevin Biggie (Weidmann)
9. Evanne Wang (DuPont)

The WG voted and approved that the CRG would have the authority to make changes to Draft D.6 and subsequent drafts based on the IEEE-SA balloting process. This was motioned by Jinesh Malde (M&I Materials) and seconded by Phil Hopkinson (HVolt).

The Chair noted that changes to Draft D.6 from the balloting process will be documented and communicated to the balloting pool after the CRG finishes a draft, and that the balloting pool will have access to the drafts to vote. Additionally, it was noted that one does not need to be a member of the CRG to view the most current draft. The Chair announced that those interested in joining the balloting pool should do so through the IEEE MyProject website.

The Chair thanked everyone for their participation as this is the last in-person meeting for the WG to amend 1276. Phil Hopkinson (HVolt) makes a motion to adjourn the meeting, which was seconded by Sam Sharpless (Rimkus Consulting).

During adjournment, Sam Sharpless (Rimkus Consulting) noted that AdCom is looking to re-number IEEE 1276 standard to be a part of the C57 series of standards.

No additional input or comments were received, and the meeting was adjourned at 11:48 pm PT.

Respectfully submitted,

Kevin Biggie, Chair
George Frimpong, Vice-Chair
Evanne Wang, Secretary

Attendance WG IEEE 1276a Annex B & D Meeting (10/28/2024):

- Attendees present: Eighty-nine (89)
- Members present: Nineteen (19) (19 required for quorum)
- Guests requesting membership: Not applicable
- Guests granted membership: Not applicable

The following attendees were present:

Last/Family/ Surname	**First/Given Name**	**Affiliation / Company Name**	**Status / Role**
Avanoma	Onome	MJ Consulting	Guest
Beaster	Barry		Guest
Benitez	Orlando	Hyosung HICO	Guest
Biggie	Kevin	Weidmann Electrical Technology	Chair
Bradshaw	Jeremiah	Bureau of Reclamation	Guest
Bradshaw	Garrett	Howard Industries	Guest
Brzoznowski	Steven	BPA	Guest
Calitz	David	Siemens Energy	Guest
Casallas	Camilo	Trench	Guest
Casserly	Edward	Ergon	Member
Castellanos	Juan	Prolec GE	Member
Castillo	Alonso	Kaedi Energy Solutions	Guest

Chambers	Stuart	EPRI	Member
Chiang	Solomon	The Gund Company	Guest
Cisco Sollberg	Adriana	Salt River Project	Guest
Crochett	Daniel	Ameren	Guest
Cruz Valdes	Juan Carlos	Prolec GE Mty	Guest
Davoudi	Pouney	Delta Star Inc.	Guest
Dolloff	Paul	East Kentucky Power	Guest
Door	Jeffrey	The H-J Family of Companies	Member
Duarte	Fernando	EPRI	Guest
Elson	Eric	San Diego Gas & Electric	Guest
Espindola	Marco	Hitachi Energy	Guest
Garcia	Eduardo	Siemens Energy	Guest
Garcia-Paredes	David	Virginia Transformer Corp.	Guest
Gorzin	Alireza	Black & Veatch	Guest
Hampton	Kevin	Siemens Energy	Guest
Hernandez	Giovanni	Virginia Transformer	Guest
Hoffman	Saramma	PPL	Member
Holifield	Thomas	Howard Industries	Guest
Hopkinson	Philip	HVolt	Member
Hrkar	Miljenko	Hitachi Energy	Guest
Hussain	Mo Rashi	Mississippi State University	Guest
Jensen	Nick	Delta Star	Guest
John	John	Virginia Transformer Corp.	Guest
Johnson	Christopher	Oncor	Guest
Jonay	Ryan	Portland General Electric	Guest
Joseph	Foldi	FEA	Guest
Kennedy	Sheldon	Sheldon P. Kennedy Engineering PLLC	Guest
Kim	Seungmo	Hyosung HICO	Guest
Kiparizoski	Zan	Howard Industries	Member
Kosedagi	Nihat	Hitachi Energy	Guest
Koshel	Anton	Delta Star Inc.	Guest
Lee	Junho	HD Hyundai Electric	Guest
Lee	Jihun	HD Hyundai Electric	Guest
Li	Chao	Eaton	Member
Loiselle	Luc	Tetra Tech	Guest
Malde	Jinesh	M&I Materials	Member
Manzano	Moses	Hyosung HICO	Guest
Martinez	Alberto	WEG Transformers	Guest
Martinez	Daniel	JFE Canada	Guest
McBride	Brian	Cargill	Member
Minikel	Justin	Eaton	Guest
Morales-Cruz	Emilio	Qualitrol	Member
Murciq	Fredy	Siemens Energy	Guest
Nissle	Boris	MGC moser-Glaser	Guest
Oakes	Stephen	WEG Transformers	Member
Panesar	Parminder	Virginia Transformer	Member
Park	Dean	Hyosung HICO	Guest
Raymond	Tim	Inductive Reasoning	Member
Reyes	David	Oncor	Guest

Reyes Perez	Juan	Hitachi Energy	Guest
Sabin	Hakan	Virginia Transformer	Guest
Salvato	Paul	Intellirent	Guest
Sarkar	Amitabh	Virginia Transformer	Guest
Sarkinen	Garret	Xcel Energy	Guest
Shaikh	Abdul Majid	Delta Star Inc.	Guest
Shannon	Michael	REA Magnet Wire	Member
Sharpless	Samuel	Rimkus Consulting	Member
Snyder	Jason	First Energy	Guest
Stankes	Dave	3M	Guest
Starcevic Prebeg	Verdana	KONCAR D&ST	Guest
Stechschulte	Kyle	AEP	Guest
Steineman	Andrew	Delta Star	Guest
Swarna	Sunny	Virginia Transformer Corp.	Guest
Takan	Can	MGC Moser Glaser Inc.	Guest
Tekle	Samuel	WEG Transformers USA	Guest
Veeran	Kannan	Virginia/Georgia Transformer	Guest
Viereck	Karsten	Reinhausen	Guest
Vyas	Pragnesh	Sunbelt Solomon	Guest
Wagner	John	AEP	Guest
Wang	Evanne	DuPont	Secretary
Wang	Luke	BC Hydro	Guest
Weisensee	Matt	Pacificorp	Guest
Weiss	Zachery	WEG Transformers	Member
Welton	Drew	Intellirent	Guest
Yavuz	Koray	Noark Electric	Guest
Young	Fei	Hitachi Energy	Guest
Zhang	Hongzhi	Hitachi Energy	Guest

Kevin Biggie made a motion to approve the draft amendment of IEEE 1276 Annex B and D for balloting. Eduardo Garcia seconded the motion. There was no objection to the unanimous consent of the motion to proceed to ballot.

H.4.2 WG PC57.91 Guide for Loading Mineral-Oil-Immersed Transformers –

David Wallach, WG Chair presented the update

Chair: David Wallach
Vice-Chair: Javier Arteaga
Secretary: Kumar Mani

No meeting was held in St. Louis. The ballot successfully closed on February 15, 2024. A comment resolution group was formed and has met seventeen times since the Spring meeting. There are a total of 448 comments comprised of 228 editorial, 149 general and 71 technical comments. One hundred and sixty-two comments were identified by the comment resolution group for discussion. One hundred and forty-five of those comments have been resolved. The group plans to recirculate the ballot by the end of this year. The PAR expires on December 31, 2025.

H.4.3 PC57.162 Guide for the Interpretation of Moisture Related Parameters in Liquid Immersed Transformers and Reactors – Tom Prevost, WG Chair presented the update

Chair: Tom Prevost
Secretary: Deanna Woods

No meeting was held in St. Louis. The comment resolution group conducted weekly virtual meetings to resolve 834 comments. A recirculation ballot will be sent next week. The PAR expires on December 31, 2024.

Tom Prevost made a motion to approve a PAR extension request. Ewald Schweiger seconded the motion. There was no objection to the unanimous consent of the motion for a PAR extension request.

H.4.4 PC57.165 IEEE Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors – Mark Tostrud WG Chair presented the update

Chair: Mark Tostrud
Vice Chair/Secretary: Zan Kiparizoski

No meeting was held in St. Louis. The guide passed during the second recirculation ballot in July and has been submitted to the Standards Review Committee (Revcom) and is in the final stages with Standards Association Standards Board review.

H.4.5 C57.119 Study Group - Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings – Ewald Schweiger Chair presented the update

Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings

1) Meeting took place at 9:30 AM (CDT) on Monday October 28th, 2024
2) After the virtual meeting on September 29th, 2024, this was the second in person meeting after Vancouver S24 In our todays in person meeting 81 attended our second in person meeting.
    - Attendance: 81
    - Members: 7
    - Guests: 74
3) A brief overview about the previous meetings of C57.119 was presented:
    - F23 - Kansas City: Start Study Group for C57.119
    - S24 – Vancouver: Recommendation to ILSC “Document needs revision” and received task to work on title / scope.
    - Sept 24 - Virtual: Voted on wording of title and scope
    - F24 – St Louis: Seek ILSC’s approval to create a PAR to revise the document. Make motion on Wednesday

- Purpose of this meeting is to work on the purpose with the objective to complete the content needed for the PAR

4) Call for patents & Copyright statement

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.

a) 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
     Total number of members is 11 requiring 6= members for quorum.
     7 members have been present in the meeting

6) Approval of agenda
   a) No comments from the group
   b) The agenda was unanimously approved (1st motion by Juan Castellanos and 2nd Bertrand Poulin)

7) Approval of meeting minutes of the previous virtual meeting from September 29th, 2024
   a) No comments from the group
   b) The meeting minutes were unanimously approved (1st motion by Bertrand Poulin and 2nd Juan Castellanos)

8) Discussion based on feedback from review of C57.119 and next steps needed for the new PAR
   The main purpose of this meeting is to work on the purpose of C57.119 and continue to identify needs for improvements / changes
   a) The discussions which took place, covered topics, like need to cover DGA, test procedure and overlapping with C57.12.90 and C57.12.91
   b) Based on the discussions and decision from the previous meeting the following wording was presented:
      Title (for PAR 2024):
      IEEE Recommended Practice for determining the thermal parameters of liquid immersed power transformers
      Scope (for PAR 2024):
      This recommended practice covers test procedures for determining the thermal parameters of liquid immersed power transformers needed to appraise the transformer's load carrying capabilities.
      Need (for PAR 2024):
      This revision is needed to maintain and provide necessary updates and corrections to this recommended practice in order to reflect today's technology.
   c) Per the decisions made in the last virtual meeting the SG chair will seek approval from the ILSC on Wednesday, October 30th, 2024 at the F24 meeting in St. Louis, MO to use the above mentioned (8b) wording of the title and scope for creation of the PAR to revise C57.119.
   d) In regards to the question from the last virtual meeting about the a purpose statement in the document, it was recommended by IEEE to include in the purpose statement in the PAR in order to be included in the "standard document". Otherwise a PAR modification needs to be applied for.
      Therefore the group decided to move forward to discuss the wording of the purpose statement

e) The current wording of the "purpose" in the PAR from 2014 were presented

Purpose (Old PAR 2014):

These recommended test procedures for performing temperature rise tests on power transformers are for the purpose of the following:

a) Determining the thermal characteristics of a transformer needed to appraise the thermal performance of a transformer at loads other than nameplate rating

b) Verifying that a transformer can be loaded with a specified load profile without exceeding specified temperature rise

c) Assessing a transformer's performance during transient loading, simulating a load cycle that includes loads in excess of nameplate rating

Tests performed in accordance with Clause 9 are for the purpose of determining transformer thermal characteristics in a consistent manner. Data may then be accumulated from a large number of transformers and used to evaluate the accuracy of the equations and the empirical constants used in the loading guides.

Tests performed in accordance with Clause 10 are for the purpose of demonstrating the thermal effects of loading a transformer with a specified sequence of loads, including loads beyond nameplate rating.

Tests performed in accordance with Clause 11 are for the combined purposes of determining the thermal characteristics of a transformer and demonstrating the thermal effects of loading with a designated load cycle. This is accomplished by performing temperature rise tests at three loads, similar to Clause 9, except the three loads are selected to simulate the thermal effects of a specific load cycle.

It is not intended that all of these procedures be performed on a transformer design. It is intended that only one of the following combinations of test procedures be specified:

- *Clause 9 only, when thermal characteristics are to be determined*
- *Clause 10 only, when only verification of complying with temperature limits when loaded to a specific load profile is needed*
- *Clause 9 plus Clause 10, when both thermal characteristics and verification of compliance with temperature limits when loaded to a specific load profile are needed*
- *Clause 11 when both thermal characteristics and verification of compliance with temperature limits when loaded to a specific load profile are required, and the load profile can be represented with three steady state loads*

The user should specify which of the test procedures are required at the time of specification.

A further purpose of these procedures is to obtain information with respect to possible loading limitations imposed on the transformer by liquid levels and ancillary equipment when the transformer is operated at loads beyond nameplate rating.

f) Extensive discussions for the wording of the purpose took place, like the content and the details needed and how possible changes in the numbering within the new document will impact the wording.

g) The final conclusion was to keep the wording simple and more general. With all further details then put into other sections, like introduction and others

h) Ryan Hogg suggested to shorten the wording and keep just the beginning and the delete the rest.

The proposal of the wording read as follows and was shown on the screen:

Purpose (for PAR 2024):

These recommended test procedures for performing temperature rise tests on power transformers are for the purpose of the following:

a) Determining the thermal characteristics of a transformer needed to appraise the thermal performance of a transformer at loads other than nameplate rating
b) Verifying that a transformer can be loaded with a specified load profile without exceeding specified temperature rise
c) Assessing a transformer's performance during transient loading, simulating a load cycle that includes loads in excess of nameplate rating

i) Bertrand Poulin made the motion to use this wording as stated above in e) and which was shown on the screen to use for the purpose statement for the application of the PAR if the ILSC will approve the creation of the PAR in SC meeting on the following Wednesday. Juan Castellanos provided second.
   - Motion was carried unanimously with no objections or abstentions.

j) The ILSC Chair Samuel Sharpless took the opportunity to express his appreciation to the group to take this task forward and thanked for the established results.

9) Based on this, we will seek approval from the ILSC on Wednesday, October 30th, 2024 at the F24 meeting in St. Louis, MO to request a PAR to revise C57.119

10) The meeting was adjourned at 10:30 AM (CDT)

11) Next meetings (planned):
   - Virtual meeting – might be scheduled before March 2025
   - In-person meeting S25 – March 23-27, 2025 in Denver, CO

Respectfully submitted,
Ewald Schweiger
Study Group Chair

List of attendees for this meeting:

Last name	Given name	Affiliation	Status
Adams	Kayland	Prolec Ge Waukesha	G
Arnold	Elise	SGB	G
Bargone	Gilles	FISO	G
Blaydon	Daniel	Baltimore Gas and Electric	G
Bohrn	Josh	PacifiCorp	G
Bradshaw	Garrett	Howard Industries	G
Calil	Wilerson	Hitachi Energy	G
Carrizales	Alfredo	PROLEC	G
Castellanos	Juan	Prolec GE	M
Cisco Sullberg	Adriana	Salt River Project	G
Craven	Michael	Qualus	G
Crockett	Dan	Ameren	G
Dappen	Tim	CARGILL	G
Davoudi	Ponneh	Delta Star	G
Digby	Scott	Duke Energy	G
Dillon	Nikolaus	Dominion Energy	G
Dolloff	Paul	East Kentucky Power Cooperative	G
Dorpmanns	Luc	Royal SMIT Transformers	G
Dzodan	Janko	Končar D&ST	G
Eduardo	Tolcachir	TTE Transformers	G

Elson	Eric	San Diego Gas and Electric	G
Frazier	Raymond	Ameren	G
Frye	Richard	Eaton	G
Gasic	Dragana	KONCAR D&ST	G
Greaves	Brad	WEIDMANN Electrical Technology	G
Hoffman	Saramma	PPL	M
Hogg	Ryan	Bureau of Reclamation	G
Holifield	Thomas	Howard Industries	G
Hussain	MD Rashid	Mississippi State University	G
Jensen	Nick	Delta Star	G
Kaineder	Kurt	Trench Austria	G
Katapalli	Thrinadha	Virginia transformer corporation	G
Khan	clasim	NEETRAC - Georgia Tech	G
Kim	Yeounsoo	Meppi	G
Kiparizoski	Zan	Howard Industries	G
Kumar	Arvind	Delta Star Inc	G
Lachman	Mark	Foble	G
Lembacher	Stefan	Siemens Energy	G
Mamede	Gabriel	Siemens Energy	M
Martinez Mares	Alberto	WEG Transformers USA	G
McBride	Brian	Cargill	G
Munoz	Marta	Hitachi Energy	G
Natale	Anthony	HICO America	G
Newbill	Mark	Hitachi	G
Omalley	Anastasia	Con Edison NY	G
Orozco	Eduardo	GE Grid Solutions	G
Park	Dean	Hyosung Hico	G
Patel	Sanjay	SGB-Smit USA	G
Pavicic	Tomislav	Koncar Power Transformers Ltd	G
Poulin	Bertrand	Hitachi Energy	M
Reyes perez	Juan	Hitachi Energy	G
Richardson	Michael	Ameren	G
Ronchi	Rodrigo	WEG Transformer Mexico	G
Sahin	Hakan	Virginia transformer corp	G
Sankarakurup	Dinesh	Duke Energy	G
Sarkinen	Garret	Xcel Energy	G
Schiessl	Markus	SGB	G
Schrammel	Alfons	Siemens Energy	M
Schweiger	Ewald	Siemens Energy	M / Chair
Sen	Cihangir	Duke Energy	G
Shaikh	AbdulMajid	Delta Star Inc.	G
Sharpless	Samuel	Rimkus	M / Chair ILSC
Stechschulte	Kyle	American Electric Power	G
Steineman	Andrew	Delta Star, Inc.	G
Tan	Jonathan	Northern Transformer	G
Tanaka	Troy	Burns & McDonnell	G

Tekle	Samuel	WEG Transformers USA	G
Thomas	Scott	Hitachi Energy	G
Topol	Fran	Koncar Power Transformers Ltd.	G
Tostrud	Mark	Dynamic Ratings	G
Vanderwalt	Alwyn	Electrical Consultants Inc	G
Varghese	Ajith	Prolec Ge Waukesha	G
Varnell	Jason	Doble Engineering	G
Varnell	Jason	Doble Engineering	G
Viy	Dharam	Prolec Ge Waukesha	G
Wagner	John	American Electric Power	G
Watson	Joshua	NPPD	G
White	Joe	Power Engineers	G
ZHENQUAN	YU	Sieyuan Toshiba	G
Zibert	Kris	Allgeier Martin & Associates	G
Ziger	Igor	Končar - Instrument Transformers	G

Approved minutes from the virtual meeting on September 24, 2024:

Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings

1) Meeting took place at 10:000 AM (EDT) on Tuesday September 24th, 2024
2) After the virtual meeting on January 31st, 2024, the first in person meeting in Vancouver on March 11th , 2024 – in our todays virtual meeting 29 attended our second virtual meeting.
   Attendance: 29 Members: 6 Guests: 23
3) In Kansas City F23 meeting, it was decided to start a Study Group for C57.119 Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings.

   In Vancouver we provided the Insulation Life Subcommittee (ILSC) with a recommendation that the document needs revision and the ILSC gave us the task to work on the PAR.

   Purpose of this virtual meeting is to work on the title and scope with the objective to present the title and scope during the meeting of the ILSC in St Louis
4) Call for patents & Copyright statement
   a) 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.
   b) 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
  Total number of members is 8 requiring 6= members for quorum.
  5 members have been present in the meeting

6) Approval of agenda
   a) No comments from the group
   b) The agenda was unanimously approved (1st motion by Steve Antosz and 2nd Bertrand Poulin)
7) Approval of meeting minutes of the previous in person meeting I Vancouver, CAN on March 11th, 2024
   a) The minutes were displayed on the screen and presented
   a) No comments from the group
   b) The meeting minutes were unanimously approved (1st motion by Steve Antosz and 2nd Bertrand Poulin)
8) Discussion based on feedback from review of C57.119 and next steps needed for the new PAR
   a) Collected feedback about the need for revision were presented (like Errors, clarifications, improvements, updates, new technology and clarification needed for the title, scope etc)
   b) The current wording of the "title" and "scope" in the PAR from 2014 were presented
      Title (Old PAR 2014):
      IEEE Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings
      Scope (Old PAR 2014):
      This recommended practice covers temperature rise test procedures for determining those thermal characteristics of power transformers needed to appraise the transformer's load carrying capabilities at specific loading conditions other than rated load.
   c) Extensive discussions for the title took place, like procedure of temperature rise tests in C57.12.90 vs. C57.119, brief title, evaluation of the test results vs. procedure to get to the test results
   d) Discussion took place about "Recommended practice" vs. "Guide"
      The definition from the IEEE SA Guide was shown:
      - Recommended practices: *Documents in which procedures and positions preferred by IEEE are presented.*
      - Guides: *Documents in which alternative approaches to good practice are suggested but no clear-cut recommendations are made.*
      The conclusion of the group was that the already used "Recommended practice" is the best fit
   e) Extensive discussions for the scope took place, like parameters vs characteristics
      → The group recognized the necessity of aligning the terminology for parameters and characteristics in the document with the wording used in the title and scope.
   f) Based on the discussions the following wording was worked out:
      Title (for PAR 2024):

IEEE Recommended Practice for determining the thermal parameters of liquid immersed power transformers

Scope (for PAR 2024):

This recommended practice covers test procedures for determining the thermal parameters of liquid immersed power transformers needed to appraise the transformer's load carrying capabilities.

9) Bertrand Poulin made the motion to recommend to the ILSC to use the above mentioned (8f) wording for the new PAR. Juan Castellanos provided second.
   - Motion was carried unanimously with no objections or abstentions.
10) Steve Antosz raised the issue of including a purpose statement in the document, despite it not being mandatory for the PAR. After discussion, the group reached the consensus that the purpose should indeed be included in the document.
    → Ewald Schweiger will get in contact with IEEE SA to get clarification about the best way to move forward.
11) The group continued to work on the wording of the "need" in the PAR
    a) The current wording of the "need" in the PAR from 2014 were presented

       Need (Old PAR 2014):

       IEEE Recommended Practice C57.119 is nearing its end of life. It is still needed and is technically valid as it is currently written. However, the Nomenclatures used to note reference Standards are not consistent with the current IEEE-SA format and need to be updated to meet the existing IEEE-SA Standards Formatting
    b) Discussions were held and based on the wording of the new title and scope resulting in the following wording for the "Need":

       Need (for PAR 2024):

       This revision is needed to maintain and provide necessary updates and corrections to this recommended practice in order to reflect today's technology.
12) Bertrand Poulin made the motion to use the above mentioned (11b) wording for the new PAR. Steve Antosz provided second.
    - Motion was carried unanimously with no objections or abstentions.
13) Based on this, we will seek approval from the ILSC on Wednesday, October 30th, 2024 at the F24 meeting in St. Louis, MO to request a PAR to revise C57.119
14) The meeting was adjourned at 11:35 AM (EDT)
15) Next in person meeting – October 2024 in St Louis, MO

Respectfully submitted,
Ewald Schweiger
Study Group Chair

List of attendees for this meeting:

Last name	Given name	Affiliation	Status
Adams	Kayland	Prolec GE Waukesha	G
Antosz	Steve	Stephen Antosz & Associated	M
Bargone	Gilles	FISO	G
Berube	Jean-Noel	Rugged Monitoring Quebec Inc	G
Blaszczyk	Piotr	Specialty Transformer Components LLC.	G

Carrizales	Juan Alfredo	PROLEC	G
Castellanos	Juan G.	Prolec	M
Dillon	Nikolaus	Dominion Energy	G
Ghosh	Saurabh	GE	G
Gonzalez	Luis	Canduct Industries	G
Grandbois	Luke	IFD Technologies	G
Hogg	Ryan	Bureau of Reclamation	G
Jensen	Nick	Delta Star	G
Katapalli	Thrinadha	VA Transformer	G
Kennedy	Gael R	GR Kennedy & Associates LLC	M
Kim	Yeounsoo	Mitsubishi Electric Power Products	G
Mamede	Gabriel	Siemens Energy	G
Martinez Mares	Alberto	WEG Transformers USA	G
McBride	Brian	Cargill	G
O'Malley	Anastasia	Consolidated Edison Co. of NY	G
Peterson	Caroline	Xcel Energy	G
Poulin	Bertrand	Hitachi Energy	M
Ronchi	Rodrigo	WEG Transformers	G
Schrammel	Alfons	Siemens Energy	M
Schweiger	Ewald	Siemens Energy	M
Sohail	Muhammad Abdullah	Trench Limited	G
Stechschulte	Kyle	American Electric Power	G
Welton	Drew	Intellirent	G
Zibert	Kris	Allgeier Martin & Associates	G

Ewald Schweiger made a motion to approve a PAR for revision of C57.119 with the following title and scope:
Title: IEEE Recommended practice for determining the thermal parameters of liquid immersed power transformers
Scope: This recommended practice covers test procedures for determining the thermal parameters of liquid immersed power transformers needed to appraise the transformer's load carrying capabilities.
Eduardo Garcia seconded the motion. There was no objection to the unanimous consent of a PAR.

H.4.6 Study Group – Proposed Guide to Interpretation of Direct and Indirect Tests for the Degradation of Cellulosic Materials in Oil Immersed Transformers –

Lance Lewand, Chair, presented the meeting minutes

Chair: Lance Lewand
Vice Chair/Acting Secretary: Stuart Chambers

Degradation of Cellulose in Liquid-Filled Transformers
Ballroom C
Hyatt Regency – St, Louis, MO
October 28, 2024

This was the 2nd meeting of this study group on proposal for the degradation of cellulose in liquid-filled transformers. There was a large attendance of at least 80+ people that spilled out into the hallway. The

interest in this subject was demonstrated at the last meeting in Vancouver when the participants decided to go forward in developing this subject matter.
At the last meeting, the amount of material proposed was considered to be too ambitious and so this meeting was to pare down the amount of material and the main focus. In the end, a number of sections were combined and others were tabled through discussion with the meeting participants. The sections approved were:

1. Discussion of cellulosic materials found in liquid-filled transformers and reactors
2. Discussion of cellulosic degradation pathways and the byproducts produced
3. Tests or analyses to determine the condition of the cellulosic insulation and analysis in mineral oil and non-mineral oil liquids. Partitioning of liquid soluble aging markers
4. Frequency of testing, how to sample, and special considerations for new and in-service transformers
5. The impact of transformer preservation systems
6. Interpretation of results
7. Impact of oil processing activities on cellulose degradation byproducts
8. Minimizing cellulosic insulation degradation in transformers and reactors (have to review C57.140 to determine if this section is necessary)
9. Bibliography

In all, the number of sections was reduced from 15 to 9.
The last discussion centered on producing a title, scope and purpose so that a PAR could be issued.

Sincerely,
Lance Lewand, Doble Engineering

H.4.7 Study Group – Non-C57.91 Loading Characteristics – Tim Raymond, Chair, presented update

Chair: Tim Raymond

No meeting was held in St. Louis. A study group has been formed to consider loading characteristics for insulation systems that are not covered by C57.91. There are transformers in operation with materials that do not fall under the scope of C57.91. The study group will review existing guides and identify the gaps to propose either a revision of existing documents or the development of a new document. Interested participants should contact Tim Raymond. The group will meet during the Spring 2025 committee meeting.

H.5 Old Business

None.

H.6 New Business

The Chair presented two proposals that have come to the Insulation Life Subcommittee from the Entity Proposal Management Committee (EPMC). EPMC projects are proposals from outside organizations that are available for sponsorship by the Transformer Committee. These projects are Entity PARs and will be developed outside of our regular meetings. Anyone can participate, but only Registered IEEE Entities may vote. If sponsored, the Subcommittee will appoint a representative to assist with the development of the PAR and document. Once completed, the document will be under Subcommittee supervision for

future enhancement and revision. If rejected, the document will proceed without Transformer Committee supervision.

The first project is EPMC P0184, "Guide for measurement of the polymerization degree of insulating paper-paperboard for power transformers based on terahertz time domain spectroscopy". The Chair reviewed the information shared by the entity affiliate, The State Grid Shanxi Electric Power Research Institute.
Title: Guide for measurement of the polymerization degree of insulating paper/paperboard for power transformers based on terahertz time domain spectroscopy
Scope: This guide describes a method for measuring the degree of polymerization of insulating paper/paperboard for power transformers based on terahertz time-domain spectroscopy.
This guide applies to equipment such as oil immersed transformers, reactors, current transformer, potential transformer, and bushings.
Purpose: The purpose of this guide is to propose a new non-destructive method for measuring the degree of polymerization of insulating paper/paperboard, in order to solve the problems of difficult sampling and complex testing processes in the past, and to accurately perceive and timely detect the deterioration of oil-paper insulation system during the operation and maintenance of oil-filled equipment.

Attendees discussed the proposed project. **Tom Prevost made a motion to accept sponsorship of EPMC 0184 "Guide for measurement of the polymerization degree of insulating paper-paperboard for power transformers based on terahertz time domain spectroscopy". Poorvi Patel seconded the motion. A vote was conducted with 51 members supporting the motion, 17 members against the motion and 2 abstentions. The motion carried and the Chair will assign a liaison representative.**

The second project is EPMC P0197, "Guide for Inversion Detection of Hot-Spot Temperature and Loading Capacity in Oil-Immersed Transformers". The Chair reviewed the information shared by the entity affiliate, State Grid Anhui Electric Power Co. LTD Research Institute.
Title: Guide for Inversion Detection of Hot-spot Temperature and Loading Capacity in Oil-immersed Transformer
Scope: This guide provides the methodology and parameters for numerical modeling of oil-immersed power transformers, input/output characteristic quantities of winding hot-spot temperature inversion detection, setup of training and test datasets for artificial intelligence (AI) algorithm, error analysis, and evaluation of dynamic loading capacity. This guide applies to the oil-immersed power transformer winding hot-spot temperature inversion monitoring and dynamic loading capacity evaluation, particularly under complex operational scenarios.
Purpose: The method mentioned in this document combines numerical computation and AI technology in the calculation of hot-spot temperature in oil-immersed power transformer windings and can serve as a good alternative approach to conventional methods based on empirical formulas or other mathematic models. It can be promoted as an advanced technology that needs improvement without mandatory requirements.

Attendees discussed the proposed project. **Dave Wallach made a motion to accept sponsorship of EPMC 0197 "Guide for Inversion Detection of Hot-Spot Temperature and Loading Capacity in Oil-Immersed Transformers". Eduardo Garcia seconded the motion. A voice vote was conducted for those in favor and those opposed. There were no voiced abstentions. The motion carried and the Chair will assign a liaison representative.**

The meeting adjourned at 9:20am CDT.

Annex H

Attendance:
95 Members
90 Guests

Status	Last	First	Company
Member	Adams	Kayland	Prolec-GE Waukesha
Member	Almeida	Nabi	ProlecGE
Guest	AVELINO	PAULO	Hitachi Energy
Member	Ayers	Donald	Ayers Transformer Consulting
Member	Ballard	Casey	DuPont
Member	Bargone	Gilles	FISO
Guest	Baumgartner	Christopher	We Energies
Member	Beaster	Barry	H-J Enterprises, Inc.
Guest	Beaudoin	Jason	Weidmann
Guest	Benitez	Orlando	Hyosung HICO
Member	Biggie	Kevin	Weidmann
Guest	Blackwell	Zack	TCI
Guest	Blaszczyk	Piotr	SPECIALTY TRANSFORMER COMPONENTS LLC
Member	Boettger	William	Boettger Transformer Consulting LLC
Guest	Bonn	Mike	Soltex Inc.
Member	Botti	Michael	Hyosung HICO
Guest	Bradshaw	Garrett	Howard Industries
Member	Bruce	Webb	Knoxville Utilities Board
Member	Calitz	David	Siemens Energy Inc
Guest	Carrizales	Alfredo	PROLEC
Member	Casallas	Camilo	Trench
Member	Casserly	Edward	Ergon
Member	Castellanos	Juan	Prolec GE
Member	Cheim	Luiz	Hitachi Energy
Member	Chiang	Solomon	The Gund Company
Guest	Cho	Eunyoung	HICO AMERICA
Guest	Choksi	Bhaumik	Hitachi energy
Guest	Colopy	Craig	Retired from EATON
Guest	Cordova	David	Maddox Industrial Transformer
Guest	Crotty	John	Ameren
Member	Da Silva	Roberto	Maschinenfabrik Reinhausen
Member	Delgado Zamora	Gabriel	Invenergy
Member	Digby	Scott	Duke Energy
Guest	Dillon	Nikolaus	Dominion Energy
Guest	Dolloff	Paul	EKPC
Member	Door	Jeff	The H-J Family of Companies
Guest	Duffy	Jesse	Nashville Electric Service

Guest	Elson	Eric	San Diego Gas & Electric
Member	Ermakov	Evgenii	Hitachi Energy
Member	Ferreira	Marcos	Quanta Technology, LLC
Guest	Franklin	Chris	MG Power Associates
Member	Frotscher	Rainer	Maschinenfabrik Reinhausen GmbH
Guest	Gamboa	Jose	
Guest	Garcia	Miguel	Hitachi Energy
Member	García	Eduardo	Siemens Energy
Guest	Garcia-Paredes	David	Virginia Transformers Corp
Member	Gardner	James	Prolec-GE Waukesha
Guest	Garner	Joshua	Independent Dielectrics
Guest	Garza	Gilberto	Prolec GE
Guest	Gaytan	Carlos	Prolec GE
Member	Giraldo	Orlando	THE H-J FAMILY OF COMPANIES
Member	Gorzin	Alireza	Black & Veatch
Guest	Greaves	Brad	Weidmann Electrical Technology
Member	Gyore	Attila	MIDEL and MIVOLT Fluids Ltd
Guest	Hampton	Kevin	Siemens Energy
Member	Hayes	Roger	GE Vernova
Member	Hernández cano	Sergio	Hammond power solutions
Guest	Herron	William	Reinhausen
Member	Hoffman	Saramma	PPL
Guest	Holifield	Thomas	Howard Industries
Guest	Hollrah	Derek	Burns & McDonnell
Member	Hopkins	Traci	H2scan
Member	Hopkinson	Philip	Hvolt.com
Member	Hossain	Saif	Trench Group
Guest	Hrkac	Miljenko	Hitachi Energy
Member	Issack	Ramadan	
Guest	Jarosz	Patrycja	IEEE SA
Guest	Jaroszewski	Marion	Delta Star Inc
Guest	Jensen	Nick	Delta Star
Guest	Jeong	Chanho	ILJIN ELECTRIC
Member	John	John	Virginia Transformer Corp.
Member	Johnson	Christopher	Oncor
Member	Joshi	Akash	Kimley-horn
Guest	Katapalli	Thrinadha	Virginia transformer corp
Member	Kennedy	Sheldon	Sheldon P Kennedy Engineering PLLC
Member	Khan	Qasim	NEETRAC- Georgia Tech
Guest	Kim	Yeounsoo	MEPPI
Guest	Kim	Yonghui	ILJIN ELECTRIC
Member	King	Gary	Consultant
Member	kiparizoski	zan	howard industries

Member	Kirchenmayer	Egon	Siemens Energy
Guest	Kosedagi	Nihat	Hitachi Energy
Guest	Kumar	Arvind	Delta Star Inc
Guest	Labh	Ashwini	Hitachi Energy
Guest	Lamontagne	Donald	Arizona Public Service Co.
Guest	Leal	Fernando	PROLEC GE
Guest	Lee	Jihun	HD HYUNDAI ELETRIC
Guest	Lee	KangJin	Cheryong Electric
Guest	Lee	Junho	
Member	Lee	Moonhee	Hammond Power Solutions
Guest	Leigl	Angela	Eaton
Guest	Lembacher	Stefan	Siemens Energy
Member	Li	Weijun	Braintree Electric Light Department
Guest	Lim	Dongki	Iljin electric
Guest	Loiselle	Luc	Tetra tech
Member	Lucas	Tiffany	Prolec GE - Waukesha
Member	Mabrey	Stephanie	AVO Diagnostics
Member	Malde	Jinesh	MIDEL & MIVOLTS FLUIDS INC.
Guest	Mamede	Gabriel	Siemens Energy
Member	Mani	Kumar	Duke Energy
Guest	Manzano	Moses	Hyosung HICO
Guest	Marathe	Swapnil	Megger
Guest	Marulanda	Katherine	Magnetron
Guest	Mennonna	Robert	Maddox Industrial Transformer
Member	Mills	Francis	POWER Engineers
Member	Morales-Cruz	Emilio	QUALITROL
Guest	Moreno	Humberto	Siemens Energy
Guest	Morgan	Charles	Eversource Energy
Guest	Murillo	Hugo	The H-J Family
Member	Murray	DAVID	TVA
Guest	Natale	Anthony	HICO America
Guest	Nolte	Mike	Kiewit
Member	OMalley	Anastasia	Con Edison
Member	Panesar	Parminder	Virginia Transformer Corp
Member	Parkinson	Dwight	Eaton
Member	Patel	Poorvi	EPRI
Member	Patel	Rakesh	Hitachi Energy
Guest	Pham	Thien	Siemens Energy
Member	Plascencia	Miguel	PG&E
Member	Pointner	Klaus	Trench Austria GmbH
Member	Pollaro	Dominic	NASS
Guest	Post	Nicholas	WEC Energy Group
Guest	Prado	Gustavo	Siemens Energy

Member	Radu	Ion	Hitachi Energy
Member	Raymond	Timothy	Inductive Reasoning
Member	Reed	Scott	MVA
Member	Richardson	Michael	Ameren
Member	Ronchi	Rodrigo	WEG Transformers México
Member	Saad	Mickel	Hitachi Energy
Member	Sahin	Hakan	Virginia Transformer
Guest	Sanchez Rodriguez	Jesus	Voltyx
Member	Sankarakurup	Dinesh	Duke Energy
Member	Sarkar	Amitabh	Virginia Transformer Corporation
Guest	Schrammel	Alfons	Siemens Energy
Guest	Schumack	Joseph	Ameren
Member	Schweiger	Ewald	Siemens Energy
Member	Sen	Cihangir	Duke Energy
Member	Sharpless	Samuel	Rimkus
Member	Sherrukde	Hemchandra	University of Hartford
Guest	Shull	Stephen	BBC Electrical Services Inc
Member	Sinclair	Jonathan	Black and Veatch
Member	Som	Sanjib	PTT, LLC
Member	Stechschulte	Kyle	AEP
Guest	Steele	H. Allen	TVA
Guest	Steineman	Andrew	Delta Star, Inc.
Guest	Sweetser	Charles	OMICRON electronics Corp. USA
Member	Sze	Matthew	Omicron electronics Canada Corp
Guest	Tan	Jonathan	Northern Transformer
Member	Tanaka	Troy	Burns & McDonnell
Guest	Taylor	Marc	JFE Shoji Canada
Guest	Tekle	Samuel	WEG Transformers USA
Guest	Thiede	Andreas	HIGHVOLT Dresden
Member	Thomas	Scott	Hitachi Energy
Guest	Tillery	Timothy	Howard Industries
Guest	Tirado	Fernando	Prolec GE
Guest	Tolcachir	Eduardo	TTE Transformers
Member	Tostrud	Mark	Dynamic Ratings
Guest	Vaagensmith	Bjorn	Idaho National Laboratory
Guest	Van Dreel	Cole	American Transmission Company
Member	Vanderwalt	Alwyn	Electrical Consultants Inc
Member	Varghese	Ajith	Prolec GE Waukesha
Member	Varnell	Jason	Doble Engineering
Guest	Vary	Robert	Reinhausen Manufacturing Inc.
Guest	Vijayan	Krishnamurthy	Pennsylvania Transformers
Member	Verdolin	Rogerio	Verdolin Solutions

Member	Vir	Dharam	Prolec GE Waukesha
Member	von Gemmingen	Richard	Dominion Energy
Member	Vyas	Pragnesh	Sunbelt Solomon
Guest	Wagner	John	American electric power
Member	Wallach	David	Duke Energy
Guest	Wang	Luke	BC hydro
Guest	Watson	Joshua	NPPD
Member	Weisensee	Matt	PacifiCorp
Member	Weiss	Zachery	WEG transformers
Member	Welton	Drew	Intellirent
Member	White	Joe	POWER Engineers
Guest	Wong	Terry	Trench Limited
Guest	Yang	Fei	Hitachi Energy
Guest	Youn	Joseph	ILJIN Electric
Member	Yuan	Guang	Hitachi energy
Member	Yun	Joshua	Virginia Transformer Corp
Guest	Xu	Shuzhen	FM Global
Guest	Zhang	Jie	Chint electric co.,LTD.
Guest	Zhang	Hongzhi	Hitachi Energy
Member	Ziomek	Waldemar	PTI Transformers LP

19 Guests requested membership:

Status	**Last**	**First**	**Company**
Guest	Blaszczyk	Piotr	SPECIALTY TRANSFORMER COMPONENTS LLC
Guest	Carrizales	Alfredo	PROLEC
Guest	Garcia	Miguel	Hitachi Energy
Guest	Garza	Gilberto	Prolec GE
Guest	Gaytan	Carlos	Prolec GE
Guest	Hrkac	Miljenko	Hitachi Energy
Guest	Jensen	Nick	Delta Star
Guest	Kim	Yeounsoo	MEPPI
Guest	Labh	Ashwini	Hitachi Energy
Guest	Lee	Junho	
Guest	Mamede	Gabriel	Siemens Energy
Guest	Marulanda	Katherine	Magnetron
Guest	Moreno	Humberto	Siemens Energy
Guest	Nolte	Mike	Kiewit
Guest	Schumack	Joseph	Ameren
Guest	Van Dreel	Cole	American Transmission Company
Guest	Wong	Terry	Trench Limited
Guest	Yang	Fei	Hitachi Energy
Guest	Zhang	Hongzhi	Hitachi Energy

Respectfully submitted,

Anastasia O’Malley
Secretary, Insulation Life Subcommittee