Insulation Life Subcommittee

March 30th, 2022
Denver, CO

Chair: Sam Sharpless
Vice-Chair: Jinesh Malde
Secretary: Anastasia O'Malley (not present)

The Insulation Life Subcommittee (ILSC) was called to order by the Chair on March 30th, 2021, at 10:02 am MDT. The Chair 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.

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 emphasized that the final document structure and goals should be established as soon as possible. Working groups and taskforces should avoid scope creep. If new information arrives late, it should be documented in the minutes for the next revision. If necessary, the standard/guide can be reopened for amendment.

The Chair encouraged working groups to conduct on-line meetings between the regular Transformer Committee Meetings to move projects along. Notice must be sent out to all members, attendance recorded, and minutes taken to be included within the subcommittee minutes. Any PAR extension requests need to be approved by the working group and documented in the minutes. The Chair reminded everyone that working groups must achieve a two-thirds majority to submit a document for Sponsor Ballot. The subcommittee must achieve a simple majority to submit a document for Sponsor Ballot.

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 one responded to this request.

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 and recognized the following new members: Arup Chakraborty, Phil Hopkins, Stephanie Denzer, Markus Schiessl, Kent Miller.

The Chair stated that Jon Karas, Kevin Rapp and John Reagan were downgraded to guest.

H.2 Secretary's Report

The attendance poll reported that 61 out of 120 members were present in the meeting along with 86 guests. A quorum had been achieved. For the Spring 2022 Denver meeting, only paper roster was used, , supplemented by a hand count during the meeting. Participants requesting membership for the subcommittee were advised to reach out to the Chair, Vice-Chair or Secretary at the conference, through email or mention it on the paper roster. 3 guests requested membership. A list of attendees is provided at the end of this report.

The agenda for the meeting had been provided to participants in advance of the meeting for review. Phil Hopkins moved for approval of the agenda and it was seconded by Kent Miller. After hearing no objection from the

attendees, the meeting agenda was approved by unanimous consent. The Fall 2021 subcommittee meeting minutes had been provided to participants in advance of the meeting for review. Mickel Saad made a motion to approve the minutes. Tom Prevost seconded the motion. The Fall 2021 meeting minutes were approved by unanimous consent after hearing no objection from the attendees.

H.3 Ballot Approvals

The Chair requested the members to vote for two standards to go to ballot:

a) PC57-100

Motion was made by Roger Wicks to go to ballot. It was seconded by Garcia Eduardo. There were no objections and the motion passed by unanimous consent.

b) PC57-162

Motion was made by Tom Prevost to go to ballot. It was seconded by Bruce Forsyth. There were no objections and the motion passed by unanimous consent.

H.4 Taskforce Reports

H.4.1 Task Force C57.12.90 Clause 11, Temperature Rise Tests – Dinesh Sankarakurup

TF - Temperature-rise Tests		
Chair: Dinesh Sankarakurup	**Vice-Chair: Ajith M. Varghese**	**Secretary: Open**
Room: Centennial H	Date: March 29th 2022	Time: 1:45 am to 03:00 pm
Total TF Members: 43	Members present at the Quorum: 10	Attendance Per Roster : 14
Guests present: 10	Membership requested: 1	Membership accepted: 0

Chair's Remarks

The Chair welcomed members and guests to the spring 2022 meeting. The Chair briefly highlighted the requirement that while introducing one need to state their employer/ company and sponsor if the difference from the company.

Chair made the call for the patent and shared the IEEE SA slides on patent policy and copyright.

Chair informed the TF the John Reagan has stepped down from the role of secretary and for this meeting Vice Chair will also be acting as secretary. If anyone interested in taking up the role of secretary can contact the chair.

Quorum, Approval of Minutes and Agenda

At the time of quorum only 10 of the 43 members were present. Chair mentioned that all those requested membership during first meeting was granted membership but only 19 members were present during the last meeting and this has further reduced to 10. TF has requested a different timeslot for next meeting as current slot have conflict with RLFT, which is also a TF on continuous revision of C57.12.90.

The Unapproved minutes from the Spring 2021, Fall 2021 meetings and the agenda for Spring 2022 meeting was presented but due to lack of quorum was not approved. These will be emailed to members for the approval.

TF Discussions and Motion passed.

Results of two surveys were presented

- **Survey 1** : **Replacing the word "Ultimate" with "Stabilized" in C57.12.90 clause 11.3.2**

Present wording (C57.12.90- 2021): Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ultimate liquid temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1 °C, whichever is greater, during a consecutive 3 h period.

Proposed Wording: Liquid temperature rise is the difference between liquid temperature and ambient temperature. The stabilized liquid temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1 °C, whichever is greater, during a consecutive 3 h period

Response rate - 22/43 - 50%
Approve – 19/22 = 86%

TF Discussion/ Decision: Due to absence of Quorum, no motion was made to take this forward to ILSC.

- **Survey 2,** Adding a sentence to section 11.3.2 to clarify ultimate**/stabilized liquid temperature rise shall not be averaged**, returned with 95% approval

Present wording (C57.12.90- 2021): Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ultimate temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1 °C, whichever is greater, during a consecutive 3 h period.
Proposed Wording: Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ultimate temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1 °C, whichever is greater, during a consecutive 3 h period. The Ultimate liquid temperature rise determined at the end of the total loss run shall not be averaged over time
*Note: Results of Survey # 1 and subsequent decision taken by TF will be incorporated into final draft of this change

Response rate - 22/43 - 50%
Approve – 21/22 = 95%, 1 Abstained

TF Discussion/ Decision: Discussed one of the comments to change C to K since its temperature rise (over ambient) and not absolute. After discussion it was agreed to leave it as surveyed since C is used at lot of different places in C57.12.00 and C57.12.90. Due to absence of Quorum, no motion was made to move forward to ILSC.

- **Exponents to be used for K and L Type Cooling Medium**

TF had sought information/data from SC members and guest about m and n exponents to be used for K and L type cooling medium, as C57.12.90 sub clause 11.4.1 and 11.4.2 currently only cover O type cooling medium. However, the TF did not receive any data to support values to be used. In the absence of supportive data, there was a suggestion to add a note to this section, for user/manufacture to agree to values based on provide design/other data, but the consensus was to leave section as is for now.

TF Discussion/Decision: TF doesn't plan to pursue this further, unless there are adequate data to support any change.

Old/ Unfinished Business

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

Steve Antosz: Sub clause 11.4.3. Correction of liquid temperature rises for differences in altitude. This clause says to make an adjustment to oil rise when a transformer is tested at 1000 m or less and is to be operated at a higher altitude. But it does not say to make an adjustment when the opposite situation applies, such as when a transformer is tested above 1000 m and is to be operated at 1000 m or less. Currently some manufacturers are using their own formula to correct. I propose that we add verbiage to allow the reverse correction when such a situation applies.

TF Discussion/Decision: Chair reported that current IEEE formula if used for reverse correction give different temperatures for Forward and Reverse correction. Ajith Varghese volunteered to review the formula and will present the findings during next meeting.

- **Tap Selection for Temp Rise Test:**

Steve Antosz: sub clauses 11.1.2.1 and 11.1.2.2 say, "Transformer shall be tested with the combination of connections and taps that give the highest average winding temperature rise." This may be good for two-winding transformers, but (for example) for an autotransformer with a loaded tertiary, there may be cases of allowable loading that produce higher total losses (and rises), such as arithmetic or Vectorial step-up and step-down loading cases, if specified.

a) Stipulate the measurement (determination) of maximum total losses for three-winding transformers which is dependent on the combination of connection, taps, and loading case. These losses would have to injected or adjusted for using corrections in sub clause 11.4.2.

b) For an autotransformer the maximum common winding current should be circulated (or adjusted) for the measured winding temperature gradient and winding rises to be determined. If the maximum current cannot be circulated, the results should be adjusted using corrections in sub clause 11.4.1

c) Temperature rise test tap selection. Once total losses are determined, the selection of a tap position for temperature rise test should allow the current to flow in as many as possible turns and windings to avoid any possible thermal issues in untested turns and cables. In some cases, this might apply to involve series and PA transformers, if provided

TF Discussion/Decision: Hakan Sahin, Steve Antosz and Ajith Varghese volunteered to review these items and come up with proposals for the next meeting.

- **Hot spot rise calculation for OFAF /OFWF cooler transformer**

Bertrand Poulin: C57.119-2018 guide for overload tests shows typical profile, with differences in top oil temperature for OFAF and OFWF compared to ONAN and ONAF. Later in document shows calculations for difference, but in 12.90 there is no mention of the differences. Propose to ensure 12.90 makes this reference to difference between OFAF and others

TF Discussion/Decision: Juan Castellanos to review C57.119 and make a recommendation to TF during next meeting.

- **Ambient measurement location**

Ajith Varghese: Standard allows ambient measured between 1 to 2 meters away from transformer. That is large tolerance allowed which can affect rises by 0.25 to 0.5 C. Suggest standardizing to 1 Meter, which seems to be most common practice

TF Discussion/Decision: Had some discussion but no decision was made. In general, agree that 1 to 2 meter is quote large. Users prefer 2 meters, Manufactures likes 1 meter. Discussion to continue.

- **Clarification to Hottest spot Rise calculation using Fiber Optics**

Ajith Varghese: It was reported that some manufacturers are incorrectly reporting/Calculating Fiber optic HSR as the Difference in Fiber Optic Temp during gradient run and ambient. This is not correct as during gradient run, current is correct but Top Oil Temp have cooled down from Temp at total loss heat run. So, the drop in oil temp from total loss to gradient should be added to the fiber optic HSR arrived at gradient run. Difference will be 1-2 Degree C.

TF Discussion/Decision: Not discussed

- **Standardize Method for Hot resistance extrapolation**

Ajith Varghese: Different manufacturers use different methods to extrapolate. IEEE does not have a formula or method specified. Depending on different methods, temperature can vary by 1-3 degree

TF Discussion/Decision: Not discussed

New Business

Ewald Schweiger brought up a safety concern regarding resistance measurement done during temperature rise test. Though Standard allow first measurement to be taken within 4 minutes, many customers specification is reducing the limit. Since there is risk of losing order, many manufacturers are accepting reduced time and this indirectly is causing pressure on operators performing hot resistance measurement, with potential of safety mishap.

Problem statement

Current IEEE C57.12.90 [clause 11] regulations require achieving the as quickly as possible time between power shut-off at heat run end and installation of resistance measurement devices.
Current IEEE Standard C57.12.90 [clause 11] limits the period from finalization of heat run test to start of hot resistance measurement to 4 minutes.

Further to this requirement, we frequently are faced with requests from customers to achieve transition times between both tests to below 4 minutes (supported by IEEE base “as quickly as possible” “short-time” requirement).

This has the following consequences:

- test field engineers are under pressure to take additional risks in order to further reduce the transition time
- test field professionals might get exposed to high voltage - potentially causing severe harm (electroshock)
- the testing procedures could be reverted applying state-of-the-art technology including direct winding temperature measurement.

Request for modification

Integrate safety aspects into next revision of IEEE standard C57.12.90 clause 11 to help to establish an intrinsically safe testing process, including technical and engineering controls:

- Prohibited zone should be clearly marked with physical barriers
- Clear signals and verbal communication to start interactions on the product
- At no time possible to approach the energized test object
- Use the directly measured hot-spot temperature based on fiber optics as a basis and calculate the winding temperature rise based on the measured hot-spot temperature and on the measured oil temperatures.

Reliable technologies/products were not available years ago for direct hot-spot temperature measurement but are now available for use in the industry.

- Add a note in paragraph 11.2.2 which allows this alternative method for determination of the winding rise in cases where the direct measurement of the hot-spot temperature is possible. Describe the new procedure in detail.

TF Discussion/Decision:

Due to shortage of time, TF could not discuss this topic during S22 meeting.
Chair noted that the Scope of the proposal/Concern go beyond Section 11 of C57.12.90. So, he will discuss with ILSC Chair to bring this up as topic during Adcom and to make decision which is most appropriate forum to discuss and take action on this item.

Adjournment
Meeting adjourned 03.06 PM.

Attendees

First	Last	Membership	Affiliation
Dinesh	Sankarakurup	Chair	Duke Energy
Ajith	Varghese	Vice-Chair	Prolec GE Waukesha
Bruce	Forsyth	Member	Bruce Forsyth and Associates PLLC
Cihangir John	Sen	Member	Duke Energy
David	Wallach	Member	Duke Energy
Dennis	Marlow	Member	DenMar TDS Transformers
Gary	King	Member	Howard Industries
Gilles	Bargone	Member	FISO Technologies Inc.
Hakan	Sahin	Member	Virginia/Georgia Transformer
Jaber	Shalabi	Member	VanTran Industries, Inc.
Juan	Castellanos	Member	Prolec GE
Marc	Taylor	Member	JFE Shoji Power Canada Inc.
Sam	Sharpless	Member	Rimkus Consulting Group
Steve	Antosz	Member	Stephen Antosz & Associates, Inc
Alex	Alahmed	Guest	Evergy-Wolf Creek
Hampton Allen	Steele	Guest	Tennessee Valley Authority
Hakim	DulaC	Guest	Qualitrol
Jean Noel	Berube	Guest	Rugged Monitoring
Mana	Yazdani	Guest	Trench Ltd
Michael	Shannon	Guest	REA Magnet ire
Muhammad Abdullah	Sohail	Guest	Trench Ltd
Scott H	Digby	Guest	Duke Energy
Tauhid	Ansari	Guest	Hitachi Energy
Tom	Aikens	Guest	Virginia Transformers

Minutes respectfully submitted by:

Ajith M. Varghese
Vice Chair and Acting Secretary

H.5 Technical Activity Reports:

H.5.1 C57.91 IEEE Guide for Loading Mineral-Oil-Immersed Transformers – David Wallach

Working Group PC57.91 Loading Guide
Spring 2022 Meeting Minutes
March 29, 2022, 4:45 PM – 6:00 PM (MST)
Hyatt Regency Denver Convention Center, Denver, CO

1. The IEEE Copyright, Anti-Trust and Patent policies were presented.
2. Quorum was established: Members in Attendance-27; Total Members-54 and Total Attendees 91.
3. The Spring 2022 Meeting Agenda, Fall 2021 Virtual Meeting and the Dec 2021 Virtual Meeting minutes (all documents were sent prior to the meeting) were adopted unanimously unopposed after the quorum was established.
4. The Chair announced that open-source code discussions were held with Zach Draper, Malia Zaman and Joshua Gay of the IEEE Open-Source Platform Team. This will be probably the first PES WG that will be using this platform resource. It has not been determined if the code will be part of Annex G in the guide document or be made available from the IEEE website. If it is included in the guide, then the scope of the guide's PAR may need to be revised.
5. Bruce Forsyth presented the findings of the hot spot terminology task force meeting held on January 27, 2022. For details, please refer to the task force minutes attached.
6. Bruce Forsyth then proposed a motion as follows:
7. The WG PC57.91 perform a review of the current draft to ensure terms related to *hot spot* and *hottest spot* are used consistently and correctly, and

a) The following definition for *hottest spot* be included in Clause 3 of PC57.91:

hottest spot: The location of the hottest-spot temperature of a component of a transformer that is in contact with insulation or insulating liquid. The term is frequently used in reference to the hottest location of a particular component, such as a winding or the core.
Note – the term *hot spot* is sometimes used colloquially as a synonym for *hottest spot*, but the preferred technical term is *hottest spot* when referring to the location with the highest temperature.
The motion was seconded by Eduardo Garcia. During the discussions, Sanjib Som questioned that tank and core flux interactions could result in more than one hottest spot. Bruce explained that no specific location has been proposed by the TF and there could be one for the winding and one for the core.
The motion was then unanimously passed with no opposition. The preferred term is now "hottest spot" (not hot spot), and it will replace 52 instances of the term "hot spot" in the current draft guide document.

8. The Chair made a presentation about the changes made to Annex A - Bubble Evolution. He remarked that the proposed revisions were sent out to the WG after the Dec 4, 2021 meeting for comments. Some comments had been received and further revisions were made, and the revised draft was circulated to the WG prior to this meeting. The Chair asked if there were further comments.
   Wally Binder wanted to know the basis of the changes for equation A2. The Chair agreed to talk to Oleg Roizman about it and share details with the WG.
9. There was question about the open-source code. Zach agreed to share the code with anyone interested in trying it out. It is written in Python language which is an open-source software that can downloaded from the web. Zach mentioned that he has test run the code and would appreciate if more users could try it as well.
10. The Chair then presented the revisions made to the Thermal Model Clause 7. He remarked that the proposed revisions were sent out to the WG after the Dec 2021 meeting (and prior to this meeting) for comments. The Chair remarked that we may need to check if any copyright approval is required to use some of the new proprietary equations now in Clause 7. The Chair asked if there were any further comments, and they were none.
11. The Chair mentioned that the plan now was to incorporate the revised Clause 7 and Annex A portions in the current draft guide document and send the revised D4 draft as a straw ballot to the WG this summer

for further comments. The final D4 draft of the guide will be put to a WG vote for approval during the Fall 2022 meeting before starting the IEEE SA Ballot process. The goal is to put the guide document on the Fall 2023 Revcom Agenda as the current PAR expires in 2023.

12. The Fall 2022 will be held between Oct 16-20, 2022, at Charlotte.

13. The Chair asked if there were any open items for discussions, and hearing none, the meeting was concluded.

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

Attendance

First Name	Last Name	Role	Company	Requested Membership
Kayland	Adams	Guest	SPX Transformer Solutions, Inc.	
Alex	Alahmed	Guest	Energy- Wolf Creek	
Elise	Arnold	Guest	SGB	
Javier	Arteaga	Vice-Chair	Hitachi Energy	
Onome	Avanoma	Guest	MT Consulting	
Gilles	Bargone	Member	FISO Technologies Inc.	
Jared	Bates	Guest	Oncor Electric Delivery	Y
Jason	Beauddin	Guest	Weidmann Electrical Technology	
Olle	Benzler	Guest	Megger	
Jean-Noel	Berube	Guest	Rugged Monitoring Inc.	
Wallace	Binder	Member	W Binder Consultant	
Daniel	Blaydon	Member	Baltimore Gas & Electric	
William	Boettger	Guest	Boettger Transformer Consulting LLC	
Jeremiah	Bradshaw	Guest	Bureau of Reclamation	
Juan Alfredo	Carrizales	Guest	Prolec GE	
Juan	Castellanos	Member	Prolec GE	
Arup	Chakraborty	Guest	Delta Star Inc.	Y
Stuart	Chambers	Guest	Powertech Labs Inc.	Y
Olivia	Cordova	Guest	Bureau of Reclamation	
Eric	Davis	Guest	Burns & McDonnell	
Pouneh	Davoudi	Guest	Delta Star Inc.	
Caesar	Diaz	Guest	EATON Corporation	
Scott	Digby	Guest	Duke Energy	

First Name	Last Name	Role	Company	Requested Membership
Paul	Dolloff	Member	East Kentucky Power	
Zachary	Draper	Member	Delta-X Research Inc.	
William	Elliott	Guest	Prolec GE	
Ergenni	Ermakov	Guest	Hitachi Energy	
Marco	Espindola	Guest	Hitachi Energy	
Sanford	Fong	Guest	Georgia Power Co.	
Bruce	Forsyth	Member	Bruce Forsyth and Associates PLLC	
George	Frimpong	Member	Hitachi Energy	
Eduardo	Garcia Wild	Member	Siemens Energy	
Shamann	Hakim	Guest	WEG Transformers USA	
Saramma	Hoffman	Member	PPL Electric Utilities	
Ryan	Hogg	Guest	Bureau of Reclamation	
Nick	Jensen	Guest	Delta Star Inc.	
Stephen	Jordan	Guest	Tennessee Valley Authority	
Akash	Joshi	Guest	Black and Veatch	
Jerzy	Kazmierom	Guest	Hitachi Energy	Y
Zan	Kiparizoski	Guest	Howard Industries	
Egon	Kirchenmayer	Member	Siemens Energy	
Anton	Koshel	Guest	Delta Star Inc.	
Krzysztof	Kulasek	Guest	Hitachi Energy	
Aleksandr	Levin	Member	Weidmann Electrical Technology	
Weijun	Li	Member	Braintree Electric Light Dept.	
Kumar	Mani	Secretary	Duke Energy	
Balakrishnan	Mani	Guest	Virginia Transformer Corp.	
Bruno	Mansuy	Guest	Trench France SAS	
Rogelio	Martinez	Member	Georgia Transformer	
Lee	Matthews	Member	Howard Industries	
Tony	McGrail	Guest	Doble Engineering Co.	
Emilio	Morales-Cruz	Member	Qualitrol Company LLC	
Joe	Nims	Guest	Allen & Hoshall, Inc.	
Dwight	Parkinson	Guest	EATON Corporation	
Nilesh	Patel	Guest	Hyundai Corporation	
Sanjay	Patel	Guest	Royal SMIT Transformers	
Homero	Portillo	Member	Advanced Power Technologies	
Chad	Powell	Guest	Hitachi Energy	
Thomas	Prevost	Guest	Weidmann Electrical Technology	
Benjamin	Riggins	Guest	Xcel Energy	
Tim	Rocque	Guest	SPX Transformer Solutions, Inc.	
Mickel	Saad	Member	Hitachi Energy	
Hakan	Sahin	Guest	Virginia/Georgia Transformer	
Albert	Sanchez	Guest	Knoxville Utilities Board	
Dinesh	Sankarakurup	Guest	Duke Energy	
Amitabh	Sarkar	Member	Virginia Transformer Corp.	
Daniel	Sauer	Guest	EATON Corporation	
Steven	Schappell	Member	SPX Transformer Solutions, Inc.	
Markus	Schiessl	Guest	SGB	
Jeff	Schneider	Guest	Power Partners	
Alfons	Schrammel	Guest	Siemens Energy	
Jaber	Shalabi	Guest	Vantran Transformer	

First Name	Last Name	Role	Company	Requested Membership
Samuel	Sharpless	Member	Rimkus Consulting Group	
Adetokunbe	Shosanya	Guest	Xcel Energy	
Sanjib	Som	Guest	Pennsylvania Transformer	Y
Brad	Staley	Member	Salt River Project	
Kyle	Stechschulte	Guest	American Electric Power	
Troy	Tanaka	Guest	Burns & McDonnell	
Mike	Thibault	Guest	Pacific Gas & Electric	Y
Ryan	Thompson	Guest	Burns & McDonnell	
Mark	Tostrud	Member	Dynamic Ratings, Inc.	
Alan	Traut	Guest	Howard Industries	Y
Olivier	Uhlmann	Guest	Reinhausen Canada	
Alwyn	Van Der Walt	Guest	Electrical Consultants, Inc.	Y
Robert	Van Tol	Guest	Commonwealth Associates, Inc.	
Ajith	Varghese	Guest	Prolec GE	
Jason	Varnell	Member	Doble Engineering Co.	
David	Wallach	Chair	Duke Energy	
Shelby	Walters	Guest	Howard Industries	
Alan	Washburn	Guest	Burns & McDonnell	
Bruce	Webb	Member	Knoxville Utilities Board	
Jeffrey	Wright	Member	Duquesne Light Co.	

H.5.2 C57.100 IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution and Power Transformers – Roger Wicks

Spring 2022 Meeting – 29 March 2022, 11:00 a.m. – 12:15 p.m. MDT, Denver, CO, USA

Chair: Roger Wicks,
Secretary: Kevin Biggie

The Chair called the meeting to order at 11:00 a.m. and welcomed attendees. Attendance was taken at the beginning of the meeting, and 22 members were present of 55 in the WG (one Member requested Guest status since the Fall 2021 meeting, reducing membership from 56 to 55 members), thus a quorum (of 28 of 55 members) was not achieved, and the agenda and last meeting minutes could not be approved.

Subsequent to the meeting, attendance was confirmed to be 66 attendees, with 26 members present and 40 guests (roster listed at the end of the minutes). Five guests requested membership, but a check of the current P&P manual for WGs confirmed that "New voting membership requests will not be accepted after the document has been approved by the Working Group for sponsor ballot." Thus, since the WG recently approved the document for sponsor ballot, new members will no longer be accepted.

The Chair reviewed the meeting agenda. Essential Patent Claims information and copyright information were reviewed, and no comments were noted.

The Chair then proceeded with a review of a prepared meeting presentation, beginning with a Chair's introduction on the status, recent activities and next steps with the document. The Chair then reviewed the results of the WG ballot to go to sponsor ballot, and as Draft 2.1 circulated as-is received 72% in favor of going to sponsor ballot, it exceeded the required two-thirds vote.

Also, the WG voted and approved by 94% in favor to form a Comment Resolution Group (CRG) of at least 5 members (but an odd number). The Chair then solicited volunteers and confirmed a CRG of the following 7 Members: George Frimpong, Stuart Chambers, Alan Sbravati, Jinesh Malde, Saramma Hoffman, Kevin Biggie and Roger Wicks.

Then a presentation was made by Tom Prevost supporting the proposed updated definition of thermally upgraded paper and the corresponding recent addition of Annex H to the draft. It was mentioned that the timing is good as the definition for TUP was currently open for revision in IEC TC14, IEC TC15, IEEE C57.100 and IEEE C57.12.80, and thus it is a good time to align the definition between the groups.

The Chair then reviewed some comments to the definition provided by IEC TC15 and mentioned that the comments can be considered by the CRG. Tom Prevost provided early specific feedback that putting both of the two common nitrogen content measurement methods in the standard was a good idea (ASTM D982 is the only one mentioned in the current draft). Also, 1.3% minimum nitrogen was chosen because a published reference (which he authored) showed that 1.3 % correlated quite well to the ageing test criteria of 50% tensile retention, providing also necessary margin in the case of any uncertainty.

The Chair then reviewed comments made by George Frimpong regarding the list of preferred thermal classes in Table 2, and a proposal to add more that have smaller intervals (propose including 150, 160 and 170 thermal classes to Table 2). George clarified that he is OK to keep the preferred list in C57.154, but suggests expanding it in C57.100. He also proposed to change the word "preferred" to "example" thermal classes in Table 2. Alan commented that the preferred list came from NEMA, and because there is some variation in the aging test, that rounding down to the nearest preferred option is a way to account for the variability. Roger added that it would be a challenge how to deal with the preferred thermal classes being listed in several tables in C57.154, and linked to IEEE 1. Jinesh Malde spoke in favor of keeping the word preferred because it helps to link to the thermal classes listed in C57.154. At the conclusion of the discussion, there was no opposition to resolving the comments through further discussion by the CRG, and there was no support for the need for a non-binding vote by the entire WG.

The Chair then reviewed comments received from NEMA on the proposed informative Annex D outlining a modified test procedure to determine thermal class of wire enamels as part of the full system of insulation materials in liquids. Alan provided early feedback that because it is an informative annex, that being informative should address the NEMA perceptions of the need for a new required test. Likewise, at the conclusion of the discussion, there was no opposition to resolving the NEMA comments through further discussion by the CRG.

The Chair then updated the WG that the analysis method proposed by Alan Sbravati for inclusion in C57.100, but which was not voted to be included in the WG ballot, was discussed in the new WG to amend Annex B of IEEE 1276 that it was within the scope for inclusion in that document.

The Chair then summarized the final steps for the document, being a vote at the ILSC to validate that we followed procedures and that we can go to SA ballot. Sam Sharpless spoke to reinforce the need for all ILSC people in attendance were needed to assure a quorum.

The Chair concluded that likely no meeting will be needed this Fall (2022), as the document will either be in comment resolution or will be complete. The meeting was adjourned at 12:10 p.m.

Respectfully submitted,

Roger Wicks
Chair

Kevin Biggie
Secretary

Attendance WG C57.100 Spring 2022 Meeting (66 attendees – 25 Members, 41 Guests):

Last/Family/ Surname	First/Given Name	Affiliation / Company Name	Status / Role
Alahmed	Alex	Evergy - Wolfcreek	Guest
Avanoma	Onome	MJ Consulting	Member
Bargone	Gilles	FISO Technologies Inc.	Member
Berube	Jean-Noel	Rugged Monitoring Inc.	Guest
Biggie	Kevin	Weidmann Electrical Technology	Secretary
Burke	David	Xcel Energy	Guest
Chambers	Stuart	Powertech Labs Inc.	Member
Chiang	Solomon	The Gund Company	Member
Cordova	Olivia	Bureau of Reclamation	Guest
Davoudi	Pouneh	Delta Star Inc	Guest
Diaz	Cesar	Eaton	Guest
Dulac	Hakim	Qualitrol Company LLC	Guest
Ermakov	Evgenii	Hitachi Energy	Guest
Espindola	Marco	Hitachi Energy	Guest
Frimpong	George	Hitachi Energy	Member
Fyrer	Bob	DuPont	Guest
Garza	Hector	Orto de Mexico	Guest
Hoffman	Saramma	PPL Electric Utilities	Member
Holden	Andrew	Ergon, Inc.	Guest
Hopkinson	Philip	HVOLT Inc.	Guest
Kaineder	Kurt	Siemens Energy	Member
Koshel	Anton	Delta Star Inc.	Guest
Lachman	Mark	Doble	Guest
Larison	Andrew	Hitachi Energy	Guest
Levin	Aleksandr	Weidmann Electrical Technology	Member

Li	Chao	EATON Corporation	Member
Lucas,P.E.	Tiffany	SPX Transformer Solutions, Inc.	Guest
Lugge	Andrew	Hitachi Energy	Guest
Malde	Jinesh	M&I Materials Inc.	Member
Mani	Kumar	Duke Energy	Guest
Mani	Balakrishnan	Virginia Transformer Corp.	Guest
Martinez	Rogelio	Georgia Transformer	Member
Matson	Tom	Xcel Energy	Guest
Mbouombouo	Mama	Hitachi Energy	Guest
McBride	Brian	Cargill, Inc.	Member
McCullough	Douglas	Maxima / Hyundai	Guest
McKinney	Ken	UC	Guest
Montpool	Rhea	Schneider Electric	Guest
Morales-Cruz	Emilio	Qualitrol Company LLC	Member
Munoz Molina	Martin	Orto de Mexico	Guest
Niroula	Ashmita	Ergon, Inc.	Member
Parkinson	Dwight	EATON Corporation	Guest
Pointner	Klaus	Trench Austria GmbH	Guest
Portillo	Alvaro	Ing. Alvaro Portillo	Guest
Prevost	Thomas	Weidmann Electrical Technology	Member
Prince	Jarrod	ERMCO	Guest
Riggins	Benjamin	Xcel Energy	Guest
Rocque	Tim	SPX Transformer Solutions, Inc.	Guest
Sankarakurup	Dinesh	Duke Energy	Member
Sarkar	Amitabh	Virginia Transformer Corp.	Member
Sbravati	Alan	Cargill, Inc.	Member
Schappell	Steven	SPX Transformer Solutions, Inc.	Member
Schneider	Jeff	Power Partners	Guest
Schweiger	Ewald	Siemens Energy	Guest
Selvaraj	Pugal	Virginia Transformer Corp.	Guest
Shannon	Michael	Rea Magnet Wire	Guest

Sharpless	Samuel	Rimkus Consulting Group	Member
Stankes	David	3M	Member
Theisen	Eric	Metglas, Inc.	Guest
Tostrud	Mark	Dynamic Ratings, Inc.	Member
Vyas	Pragnesh	Sunbelt-Solomon Solutions	Member
Wang	Evanne	DuPont	Member
Washburn	Alan	Burns & McDonnell	Guest
Wicks	Roger	DuPont	Chair
Williams	Trenton	Advanced Power Technologies	Guest
Zaman	Malia	IEEE	Guest

H.5.3 C57.154 IEEE Standard for Liquid Immersed Transformers Designed to Operate at Temperatures Above Conventional Limits Using High-Temperature Insulation Systems – Richard Marek

Chair, Richard Marek
Vice-Chair, Anastasia O'Malley
Secretary, Ewald Schweiger

- No meeting was held in Denver since the document is in ballot
- 5 WG meetings total
- PAR expiration date: 31 December 2022
- Ballot closed Thursday, November 18
- Ballot stats:
  - Disapprovals: 3
  - Total comments: 64
- Ballot comment resolution stats:
  - Accepted or revised: 54
  - Rejected: 10 (including 2 negative comments)

The ballot resolution group lead by Kevin Biggie did an excellent job and all the comments have been addressed and resolved. The request to Recirculate the Ballot for IEEE PC57.154 has been submitted to the Program Manager. The initial feedback was received that some procedural formalities on addressing the comments are needed. This work is in progress and when completed the request for the recirculation process will be submitted again to the Program Manager. After review and approval, the recirculation will be sent to the Standards Association Ballot group members after approval of the recirculation by the Program Manager.

We want take the opportunity to thank all for their efforts and contribution in creating this document.

Ewald Schweiger, Secretary

H.5.4 C57.162 Guide for the Interpretation of Moisture Related Parameters in Liquid Immersed Transformers and Reactors – Tom Prevost

Chair: Tom Prevost
Secretary: Deanna Woods
Meeting took place at Denver Hyatt Regency Hotel, 9:30 AM March 28, 2022
Attendance Members 31 out of 58
Guest 73
A quorum of the working group members was met with 31 out of 58 members present.
The agenda was approved as presented.
The minutes of the Spring 2021 virtual meeting were approved. (We did not meet in Fall 2021)
There was a call for patents. No one had a claim.
The copy rights policy was presented, there were no questions or comments.
The chair reviewed the project timeline:

- Original PAR was approved on August 23, 2013
- A Two Year PAR extension was approved by NESCom in December 2020.
  - Project approved until Dec 31, 2022
- PAR revision to revise title, scope and purpose to address only liquid immersed transformers was approved by NESCom in January 2021.
- Balloting needs to start after this meeting.

The chair presented the status of the document:

- Draft 7 has been compiled and edited by editor- Stephanie Denzer
- Draft 7 has been circulated to TF chairs for review and comments
- Comments have been incorporated into draft.
- Proposal is to go to ballot with this draft.

Bruce Forsyth made a motion with Stuart Chambers seconding the motion……
"We approve Draft 7 of PC57.162 to move the draft standard to the sponsor for IEEE Standards Sponsor ballot"
In order to move to ballot 2/3 of the members present needed to approve. 28 members approved the motion, so it passed. There were no disapprovals or abstentions.
Bruce Forsyth made a motion with Stuart Chambers seconding the motion……
"Move to form a Comment Resolution Group comprised of Officers and Task Force Chairs"
The motion passed with unanimous approval.
The Comment Resolution Group will include the following individuals:
Tom Prevost, Valery Davydov, Deanna Woods, Stephanie Denzer, Oleg Roizman, George Frimpong, Poorvi Patel, Ron Hernandez, Bob Razor
Meeting adjourned at 10:30 AM

Attendance:

First Name	Last Name	Member
Raj	Ahuja	
Claude	Beauchemin	
Enrique	Betancourt	x
Paul	Boman	x
Stephan	Brauer	
Edward	Casserly	x
Stuart	Chambers	x
Luiz	Cheim	
Solomon	Chiang	x
Larry	Christodoulou	x
James	Cross	
Valery	Davydov	
Sami	Debass	x
Stephanie	Denzer	x
Don	Dorris	
Hakim	Dulac	x
Roger	Fenton	
Bruce	Forsyth	x
George	Frimpong	x
James	Gardner	
Ismail	Guner	
Ronald	Hernandez	
Robert	Kinner	
Zan	Kiparizoski	x
Aleksandr	Levin	x
Jinesh	Malde	x
Kumar	Mani	x
Richard	Marek	
Terence	Martin	
Thomas	Melle	x
Hali	Moleski	
Emilio	Morales-Cruz	x
Parminder	Panesar	
Poorvi	Patel	x
Oscar	Pinon	
Thomas	Prevost	x
Jimmy	Rasco	
Robert	Rasor	
Timothy	Raymond	
Afshin	Rezaei-Zare	x

Diego	Robalino	x
Oleg	Roizman	
Mickel	Saad	x
Roderick	Sauls	
Pugal	Selvaraj	x
Samuel	Sharpless	x
K. Shane	Smith	
Brian	Sparling	x
Mike	Spurlock	
Paul	Su	
Mark	Tostrud	x
Alwyn	Van Der Walt	x
Sukhdev	Walia	
David	Wallach	x
Evanne	Wang	x
Peter	Werelius	
Roger	Wicks	x
Deanna	Woods	x

H.5.5 C57.165 IEEE Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors – Mark Tostrud

Officers

Chair – Mark Tostrud
Vice Chair/Secretary – Zan Kiparizoski

1. Meeting Date and Time: 03/29/2022 at 9:30-10:45am CST

Meeting started at 9:30am

2. Call for essential patents

The patent slides were shared on screen and a request for any known patents that were essential to the work of the Working Group was made. There were no responses to the request.

3. Reviewed IEEE-SA Copyright Policy

The copyright policy slides were shared on screen and a request for any known copyright issues was made. One member has previously submitted copyright document for his work.

4. Chairs remarks

Working group approved performing a straw ballot of the guide in December 2021. The latest draft D6.4 along with a form to submit comments/feedback was mailed to all members and guests. The straw ballot will close on 4/30/2022 at 11:59pm.

5. Attendance

- There were 40 attendees in the meeting
  - 14 members
  - 26 guests
  - 2 guests requested membership

- Quorum check
  - Quorum was achieved
    - The poll showed 14 of 20 members were present

6. Approval of the agenda and minutes

- The Chair requested a motion for approval of the meeting agenda
  - Motion – Sam Sharpless
  - 2nd – Trent Williams
  - Unanimous approval

- The Chair requested a motion for approval of the minutes from fall 2021 virtual meeting
  - Motion – Gilles Bargone
  - 2nd – Ryan Musgrove
  - Unanimous approval

7. Call for ballot resolution group members

Chair asked to form ballot resolution group, with comments to be submitted by April 30. Chair asked for volunteers for comments resolution beside working group officers. Following members volunteered to be part of the comment resolution group:

- Trent Williams
- Hakim Dulac
- Ryan Musgrove
- Gilles Bargone
- Brad Staley

Virtual meetings will be held to resolve comments as needed. WG shall approve the document before it could be sent to the subcommittee.

8. Old Business

- No old business

9. New Business

- No new business

10. The meeting adjourned at 10:00

- Motion – Jean Noel Berube
- 2nd – Hakim Dulac

11. Minutes

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

WG PC57.165 – Participation List, Denver, spring 2022 Meeting			
Role	**First Name**	**Last Name**	**Company**
Member	Gilles	Bargone	FISO Technologies Inc.
Member	Jean-Noel	Berube	Rugged Monitoring Inc.
Member	Juan	Castellanos	Prolec GE
Member	Hakim	Dulac	Qualitrol Company LLC
Member	Zan	Kiparizoski	Howard Industries
Member	Balakrishnan	Mani	Virginia Transformer Corp.
Member	Martin	Munoz Molina	Orto de Mexico
Member	Ryan	Musgrove	Oklahoma Gas & Electric
Member	Parminder	Panesar	Virginia Transformer Corp.
Member	Steven	Schappell	SPX Transformer Solutions, Inc.
Member	Stefan	Schindler	Maschinenfabrik Reinhausen
Member	Samuel	Sharpless	Rimkus Consulting Group
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Member	Trenton	Williams	Advanced Power Technologies
Guest	Nabi	Almeida	Prolec GE
Guest	Dave	Burke	Xcel Energy
Guest	Mark	Cheatham	GE
Guest	Michael	Dahlke	Central Moloney Inc.
Guest	Cezar	Diaz	Eaton Corporation
Guest	Zack	Draper	
Guest	Florin	Faur	SPX Transformer Solution
Guest	Hector	Garza	Orto de Mexico
Guest	Orlando	Giraldo	H-J family
Guest	Bridget	Havens-Spillars	Ameren
Guest	Gary	Hoffman	Advanced Power Technologies
Guest	Egon	Kirchehmayer	Siemens Energy
Guest	Angela	Leigl	Eaton Corporation
Guest	Tiffany	Lucas	SPX Transformer Solutions, Inc.
Guest	Lee	Matthwes	Howard Industries
Guest	Kent	Miller	T&R electric

Guest	Emilio	Morales	Qualitrol Company LLC
Guest	Matthew	Pinard	Weidmann Electrical Technology
Guest	Homero	Portillo	Advanced Power Technologies
Guest	Timothy	Rinks	Delta Star Inc.
Guest	Albert	Sanchez	Knoxwille Utility Board
Guest	Brian	Sparling	Dynamic Ratings, Inc.
Guest	Timothy	Tillery	Howard Industries
Guest	Matthew	Webb	GE
Guest	Bill	Whitehead	HzScan
Guest	Malia	Zaman	IEEE

H.5.6 C57.169 Maximum Winding Temperature Rise in Liquid-Filled Transformers (PC57.169 replacing IEEE 1538) – Scott Digby

Did not have a WG meeting since document is in ballot. Going through mandatory editorial changes. Going through balloting soon. Formed a comment resolution group. PAR does not expire till 2023. Anyone that wants to join the ballot group can.

H.5.7 Amendment of 1276 Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Transformers (Annex B & D) – Kevin Biggie

Monday, 28 March 2022, 1:45pm – 3:00pm (MDT) – Spring 2022 Meeting (in-person)

- Chairman: Kevin Biggie (Weidmann)
- Vice-chair: George Frimpong (Hitachi Energy)
- Secretary: Evanne Wang (DuPont)

The Chair called the meeting to order at 1:45pm. and welcomed attendees. A total of fifty-two (52) attendees were present with twenty-two (22) requesting and granted membership as this is the first WG meeting. Thus, including the Chair, Vice-Chair and Secretary, total WG membership is twenty-five (25) members.

The Chair notes that this work is to amend to the two annexes (B & D) from IEEE 1276. The meeting agenda, Essential Patent Claims information, and copyright information were reviewed. No patent claims were noted, and no copyright comments were provided by any of the attendees. The Chair continues with the agenda, which is noted below if input or comments were received:

Background

- The Chair explains the need for the previous TF and current WG, and reviews Annex B with the WG. He clarifies that this WG is to only revise Annex B and D, and not the IEEE 1276 document – and that it is important to note that this is an amendment PAR and not a revision PAR.
- Roger Wicks (DuPont) notes that the information from Annex B consisted of two sources, which were from IEEE 1276 and IEEE C57.154 and that the purpose of this work is to update older information.
- No additional comments were received for the remaining portions of Annex B.

Potential Amendment Material #1

- Alan Sbravati (Cargill) notes that the main point of the material is the additional data points on the graphs with minor changes within the text. He also notes that as a result of the last IEEE C57.100 vote, an annex of additional data analysis information can be included also.
- Bruce Forsyth (Bruce Forsyth & Associates LLC) asks Alan to clarify the addition of the annex mentioned in his previous comment. Alan clarifies that the WG for C57.100 decided to not include his proposed annex within C57.100 but recommended that the WG for Annex B consider his annex. Kevin clarified not as a new annex in 1276, but rather as a new addition within Annex B.

Potential Amendment Material #2

- The Chair notes that this amendment material contains information from additional studies that have been conducted following the procedure from IEEE C57.2011. The additional information that covers aging of ester fluids and other alternative liquids shall need to be reviewed and discussed in this WG.
- Lance Lewand (Doble) asks if synthetic esters will be a part of Annex B. The Chair responds that any aging examples can now be included as this is an amendment, including synthetic esters.
- Lance Lewand (Doble) comments that "moisture" is not the correct term as it can apply to chemicals other than water. He notes that "moisture" should be re-termed to "water" in the entirety of Annex B in the revision. Jinesh Malde (M&I Materials) agrees.
- Alan Sbravati (Cargill) comments that the additional annex he was planning on having for IEEE C57.100 was to address the first point of following the 2011 version. He notes that many of the new individual studies followed the methodology, but each study showed different results. He also notes that the methodology was not properly described in the method and that 15,000 hours is an average from many materials.
- Joe Watson (JD Waterson & Associates) asked if the work of this WG might be relevant in the short-term such as for heat run testing, in particular with regards to bubbling, as it may apply to his work with the volts per hertz group. Alan (Cargill) notes that bubbling is rather covered instead in Annex A of C57.91 and again in Annex B of IEC 60776 Part 14.

Potential Amendment Material – Others

- Roger Wicks (DuPont) comments that the aramid mineral oil data from Annex B today is from the work that was originally generated by ESSERCO from the sealed-tube testing from GE that was in IEEE 1276. The data he would like to add is additional data using the dual-temperature methodology on a mineral oil and Nomex® paper.
- Jinesh Malde (M&I Materials) comments that IEEE C57.154 is removing thermal classes based on the type of liquid and suggested adding a table of thermal classes of insulation systems as the top liquid temperature can impact performance of the liquid.
- Sam Sharpless (Rimkus Consulting) questions the previous comment as he wants to make sure the WG is not getting out of scope and producing a new loading guide: is this table of examples or consisting of data? Jinesh responds that this summary table was already discussed in IEEE C57.154 and that this table would note that these are examples based on specific solid and liquid insulation classes (e.g., mineral oil in thermally upgraded kraft).

Update on PAR approval

- The Chair shares the dates of approval and expiry for the PAR and briefly reviews the PAR with the WG.
- Sam Sharpless (Rimkus Consulting) notes that if anyone has additional data, it should be brought to the next meeting as decisions should be made early. This includes any data on the verge of being published or already published. Jinesh Malde (M&I Materials) suggests that participants should call out what data is going to be published so that the WG can set a deadline.
- The Chair notes that in the Fall 2022 meeting, the scope to guide the WG shall be defined.

- Jinesh Malde (M&I Materials) questions if the additional annex that Alan Sbravati (Cargill) mentioned earlier in the meeting belongs in the IEEE 1276 discussion or open for discussion at this WG. The Chair notes that the proposed annex did not include Alan's in the IEEE C57.100 draft but can be considered by this WG as this group can consider recommendations made by another WG but not bound by this recommendation.

The Chair opens the floor up for comments and questions:

- The Chair clarifies that amendments to any part of this annex can include additions, subtractions, and changes. Additionally, any applicable data should be brought forth to his attention prior to the next meeting.
- Alan Sbravati (Cargill) notes that he would like to send examples of insulation system thermal classes to include in the amendment for consideration. Alan shared a proposed insulation system thermal class table subsequently after the meeting for future consideration.

Meeting adjourned at 2:49pm

Respectfully submitted,

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

Attendance WG IEEE 1276 Annex B & D Meeting (3/28/2022):

- Attendees: 52
- Attendees requesting & granted membership: 22

Last/Family/ Surname	**First/Given Name**	**Affiliation / Company Name**	**Status / Role**
Almeida	Nabi	Prolec GE	Member
Bargone	Gilles	FISO Technologies Inc.	Guest
Beaudoin	Jason	Weidmann Electrical Technology	Guest
Berube	Jean-Noel	Rugged Monitoring	Guest
Biggie	Kevin	Weidmann Electrical Technology	Chair
Bonn	Mike	Soltex	Guest
Botti	Michael	Hyosun Hico	Guest
Bradshaw	Jeremiah	Bureau of Reclamation	Guest
Burks	David	Xcel Energy	Guest
Castellanos	Juan	Prolec GE	Member
Chambers	Stuart	Powertech Labs	Member
Christodoulou	Larry	Electrical Power Service	Guest
Coker	Anthony	M&I Materials	Member

Cordova	Olivia	Bureau of Reclamation	Guest
Dolloff	Paul	East Kentucky Power	Guest
Door	Jeffrey	The H-J Family of Companies	Guest
Downey	Andy	Prolec GE Waukesha	Member
Forsyth	Bruce	Bruce Forsyth & Associates LLC	Guest
Frimpong	George	Hitachi Energy	Vice-Chair
Harper	Robert	Soltex	Guest
Hopkinson	Philip	Hvolt	Member
Jakob	Karl	Cargill	Guest
Kaineder	Kurt	Siemens Energy	Member
Kiparizoski	Zan	Howard Industries	Member
Kotula	John	Dominion Energy	Guest
Kulasek	Krzysztof	Hitachi Energy	Guest
Lewand	Lance	Doble	Member
Li	Chao	Eaton	Member
Lucas	Tiffany	Prolec GE Waukesha	Member
Malde	Jinesh	M&I Materials	Member
Mani	Balakrishnan	Virginia Transformer	Member
McBridge	Brian	Cargill	Member
McCullough	Douglas	Maxima-Hyundai	Guest
Oakes	Stephen	WEG Transformers	Member
Panesar	Parminder	Virginia Transformer	Member
Puleo	Gerard	M&I Materials	Guest
Reiss	Tony	Custom Materials Inc.	Member
Sbravati	Alan	Cargill	Member
Schrammel	Alfons	Siemens Energy	Guest
Schweiger	Ewald	Siemens Energy	Member
Shalabi	Jaber	VanTran Transformer	Guest
Shannon	Michael	REA Magnet Wire	Member
Sharpless	Samuel	Rimkus Consulting	Member
Tillery	Tim	Howard Industries	Guest

Tostrud	Mark	Dynamic Ratings	Guest
Traut	Alan	Howard Industries	Guest
Von Gemmingen	Richard	Dominion Energy	Guest
Wang	Evanne	DuPont	Secretary
Watson	Joe	JD Waterson & Associates	Guest
Weiss	Zachery	WEG Transformers	Guest
Wicks	Roger	DuPont	Member
Yadav	Rahul	DuPont	Guest

H.6 Old Business

H.7 New Business

H.8 Adjournment

Motion was made by Phil Hopkinson to adjourn the meeting. It was seconded by Tom Prevost. Hearing no objection, the meeting was adjourned at 9:15 AM CST.

Attendance:

Members (61)

Last Name	**First Name**	**Company**
Sharpless	Samuel	Rimkus Consulting Group
Malde	Jinesh	M&I Materials Inc.
Antosz	Stephen	Stephen Antosz & Associates, Inc
Arteaga	Javier	Hitachi Energy
Avanoma	Onome	MJ Consulting
Ayers	Donald	Ayers Transformer Consulting
Ballard	Robert	DuPont
Bargone	Gilles	FISO Technologies Inc.
Beaster	Barry	H-J Family of Companies
Biggie	Kevin	Weidmann Electrical Technology
Boettger	William	Boettger Transformer Consulting LLC
Calitz	David	Siemens Energy
Castellanos	Juan	Prolec GE
Chakraborty	Arup	Delta Star Inc.
Chambers	Stuart	Powertech Labs Inc.
Chiang	Solomon	The Gund Company

Digby	Scott	Duke Energy
Forsyth	Bruce	Bruce Forsyth and Associates PLLC
Frimpong	George	Hitachi Energy
Frotscher	Rainer	Maschinenfabrik Reinhausen
Garcia Wild	Eduardo	Siemens Energy
Griesacker	Bill	Duquesne Light Co.
Hoffman	Saramma	PPL Electric Utilities
Hopkinson	Philip	HVOLT Inc.
Jordan	Stephen	Tennessee Valley Authority
Joshi	Akash	Black & Veatch
Kaineder	Kurt	Siemens Energy
King	Gary	Howard Industries
Kiparizoski	Zan	Howard Industries
Kirchenmayer	Egon	Siemens Energy
Levin	Aleksandr	Weidmann Electrical Technology
Li	Weijun	Braintree Electric Light Dept.
Mani	Kumar	Duke Energy
Miller	Kent	T&R Electric Supply Co.
Murray	David	Tennessee Valley Authority
Nambi	Shankar	Bechtel
Patel	Poorvi	Electric Power Research Institute (EPRI)
Parkinson	Dwight	EATON Corporation
Prevost	Thomas	Weidmann Electrical Technology
Reed	Scott	MVA
Saad	Mickel	Hitachi Energy
Sankarakurup	Dinesh	Duke Energy
Sarkar	Amitabh	Virginia Transformer Corp.
Sbravati	Alan	Cargill, Inc.
Schiessl	Markus	SGB
Schneider	Jeffrey	Power Partners/Spire Power Solutions
Schweiger	Ewald	Siemens Energy
Skinger	Kenneth	Scituate Consulting, Inc.
Som	Sanjib	Pennsylvania Transformer
Staley	Brad	Salt River Project
Szczechowski	Janusz	Maschinenfabrik Reinhausen
Tanaka	Troy	Burns & McDonnell
Tostrud	Mark	Dynamic Ratings, Inc.
Traut	Alan	Howard Industries
Van Der Walt	Alwyn	Electrical Consultants, Inc.
Varghese	Ajith	SPX Transformer Solutions, Inc.
Vyas	Pragnesh	Sunbelt-Solomon Solutions
Wallach	David	Duke Energy
Wang	Evanne	DuPont

Whitehead	William	H2scan Corporation
Wicks	Roger	DuPont

Guests (86)

Adams	Kayland	SPX Transformer Solutions, Inc.
Alahmed	Alex	Energy-Wolfcreek
Almeida	Nabi	Prolec GE
Anderson	Gregory	GW Anderson & Associates, Inc.
Arnold	Elise	SGB
Beaudoin	Jason	Weidmann Electrical Technology
Benzler	Olle	Megger
Botti	Michael	Hyosung HICO
Bradshaw	Jeremiah	Bureau of Reclamation
Brown	Darren	Howard Industries
Burge	David	Xcel Energy
Carrizales	Juan Alfredo	Prolec GE
Christodoulou	Larry	Electric Power Systems
Coker	Anthony	M&I Materials Inc.
Cordova	Olivia	Bureau of Reclamation
Cruz Valdes	Juan Carlos	Prolec GE
Dahlke	Michael	Central Moloney
Davis	Eric	Burns & McDonnell
Davoudi	Pouneh	Delta Star Inc.
DeRouen	Craig	ERMCO
Diaz	Cesar	EATON Corporation
Dillon	Nikolaus	Dominion Energy
Dolloff	Paul	East Kentucky Power Cooperative
Downey	Andy	Prolec GE
Drapery	Zachory	Delta-X Research
Ermakov	Evgenii	Hitachi Energy
Espindola	Marco	Hitachi Energy
Frye	Richard	EATON Corporation
Gamboa	Jose	H-J Family of Companies
Gragert	Jeffrey	Xcel Energy
Hakim	Shamaun	WEG Transformers USA Inc.
Havens	Bridget	Ameren
Heiden	Kyle	EATON Corporation
Hollrah	Derek	Burns & McDonnell
Issack	Ramadan	American Electric Power
Jensen	Nick	Delta Star Inc.
Kazmierczak	Jerzy	Hitachi Energy

Knapp	Evan	EATON Corporation
Koshel	Anton	Delta Star Inc.
Kutzleb	Michelle	TJH2b Analytical Services
Larison	Andrew	Hitachi Energy
Leigl	Angela	EATON Corporation
Li	Chao	EATON Corporation
Lucas, P.E.	Tiffany	SPX Transformer Solutions, Inc.
Matson	Tom	Xcel Energy
Mbouombouo	Mama	Hitachi Energy
McBride	Brian	Cargill, Inc.
Montpool	Rhea	Schneider Electric
Morales-Cruz	Emilio	Qualitrol Company LLC
Musgrove	Ryan	Oklahoma Gas & Electric
Nesvold	Brady	Xcel Energy
Nunez	Arturo	
Patel	Nitesh	Hyundai Power Transformers USA
Pepe	Harry	Phenix Technologies, Inc.
Pinard	Matthew	Weidmann Electrical Technology
Pollaro	Dominic	NASS
Portillo	Homero	Advanced Power Technologies
Posadas	Daniel	Prolec GE
Prince	Jarrod	ERMCO
Rocque	Tim	SPX Transformer Solutions, Inc.
Roussell	Marnie	Entergy
Sahin	Hakan	Virginia/Georgia Transformer
Sanchez	Albert	Knoxville Utilities Board
Schappell	Steven	SPX Transformer Solutions, Inc.
Schindler	Stefan	Maschinenfabrik Reinhausen
Schrammel	Alfons	Siemens Energy
Selvaraj	Pugal	Virginia Transformer Corp.
Sen	Cihangir	Duke Energy
Sharp	Michael	Trench Limited
Shingari	Avijit	Pepco Holdings Inc.
Shull	Stephen	BBC Electrical Services, Inc.
Simons	Andre	JFE Shoji Power Canada Inc.
Sparling	Brian	Dynamic Ratings, Inc.
Spurlock	Mike	Spurlock Engineering Services, LLC
Stankes	David	3M
Stechschulte	Kyle	American Electric Power
Steineman	Andrew	Delta Star Inc.
Sweetser	Charles	OMICRON electronics Corp USA
Taylor	Marc	JFE Shoji Power Canada Inc.

Vantol	Robert	Commonwealth Associates
Washburn	Alan	Burns & McDonnell
Webb	Bruce	Knoxville Utilities Board
Weiss	Zachery	WEG Transformers USA Inc.
Whitten	Christopher	Hitachi Energy
Zaman	Malia	IEEE
Zemanovic	Kyle	EATON Corporation

Guests requesting membership:

Nabi Almeida, Kyle Stechschulte and Chao Li

Respectfully submitted,

Jinesh Malde
Vice-Chair, Insulation Life Subcommittee