Annex H Insulation Life Subcommittee

April 5, 2017
Astor Hotel, New Orleans, LA

Chair: Sheldon Kennedy
Vice-Chair: Barry Beaster
Secretary: Sam Sharpless

The Insulation Life Subcommittee was called to order by the Chair in New Orleans, Louisiana on April 5, 2017 at 8:11 AM. 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 provided the dates of upcoming TC meetings as follows;

2017 Fall Meeting; October 29-30, 2017, Louisville, Kentucky, USA

2018 Spring Meeting; March 25-29, 2018, Pittsburgh, Pennsylvania, USA

2018 Fall Meeting; October 14-18 or 21-25, 2018, location to be determined.

The Chair requested that any person with knowledge of a patent essential to meet the requirements of any subcommittee standard to bring the issue forward for discussion. No one responded to this request.

The Chair requested the following items be included in all activity group minutes;

- The name of the activity
- The date and time of the meeting
- The number of members and guests in attendance. Full attendance should be recorded in the AMS system
- The presence or absence of a quorum
- Any essential patent issues raised during the meeting.
- A summary of discussion. Intricate detail not required. Use a separate document to explain decisions that are made.
- A record of the decisions made in the meeting
- If there will be another meeting. If so, state the time and place.
- Submit minutes as soon as possible, but no more than 15 days after the meeting.

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 discussed the membership requirements and recognized the following new members;

- Victor Garcia
- Weijun Li
- Juliano Montanha
- Marcos Ferreira
- Klaus Pointner
- Jimmy Rasco
- Alan Sbravati
- Hamid Sharifnia
- Ismail Guner
- Vladimir Abril
- Ali Naderian

The Chair discussed the requirements for continued membership and stated that the following members had been moved to guest status;

- Kiran Verdante
- Jerry Reeves
- Alvaro Portillo
- Jose Valencia
- Zoilo Roldan
- Keith Ellis

The Chair noted that the following guest had been removed from subcommittee rolls by request;

- David Harris

The Chair reported on the status of subcommittee Projects;

- C57.91 - IEEE Guide for Loading Mineral Oil-Immersed Transformers; C57.91 is valid until 2021.

- C57.100 - IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution Transformers; C57.100 is valid until 2021.

- C57.119 - IEEE Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings; C57.119 is valid until 2018. The working group chair for revision of this document is Gael Kennedy.

- C57.154 - Design, Testing and Application of Liquid-Immersed Transformers with High-Temperature Insulation; C57.154 is valid until 2022.

- C57.162 – Guide for the Interpretation of Moisture Related Parameters in Dry, Gas Insulated and Liquid Immersed Transformers and Reactors; The C57.162 PAR expires December 31, 2017. The standard is valid until 2018. The working group chair for revision of this document is Thomas Prevost.

- 1276 – Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Tranformers; The 1276 PAR expires December 31, 2016. The standard is valid until 2018.

A PAR extension has been requested. The working group chair for revision of this document is Roger C. Wicks

- 1538 – IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid-Filled Transformers; 1538 is valid until 2021. Amendment approved September 2015. working group chair for revision of this document is Richard P. Marek.

H.2 Secretary's Report

The Secretary reported that according to the electronic check-in system, 64 of 109 members were present at the start of the meeting and that a quorum had been achieved.

The Fall 2016 subcommittee meeting minutes was provided to participants in advance of the meeting for review. Mr. Pat McShane stated that his post-meeting comments included in the minutes were in error and requested that the first sentence of his last point be deleted. The amended minutes were then approved with no objections.

The Spring 2017 subcommittee meeting agenda was provided to participants in advance of the meeting for review. The agenda was approved with no objections.

The Chair presented the agenda for the current meeting. Stephen Antosz noted that a representative the Chinese Society of Electrical Engineers desired to address the group and requested that they be placed on the agenda as new business and the Chair agreed to do so. Sanjib Som made a motion to approve the amended agenda. Don Ayers seconded the motion and there was unanimous approval.

Consolidation of the electronic check-in records and the written attendance rosters after the meeting provided the following final attendance totals;

Total Present	234
Members	76
Guests	105

Eight guests requested membership via the membership roster.

The following requestors met the membership criterion;

Jose Gamboa
Saurabh Ghosh
Jinesh Malde
Mickel Saad
Robert Thompson
Jason Varnell
Michel Veillette

The following requestors did not meet the membership criterion as of this meeting;

James Thompson

H.3 Project Status Reports

H.3.1.1 C57.91 IEEE Guide for Loading Mineral-Oil-Immersed Transformers

C57.91 is valid until 2021.

H.3.1.2 C57.100 IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution Transformers

C57.100 is valid until 2021.

H.3.1.3 C57.119 IEEE Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings

C57.119 is valid until 2018 and is Chaired by Gael Kennedy.

H.3.1.4 C57.154 Design, Testing and Application of Liquid-Immersed Transformers with High-Temperature Insulation

C57.154 is valid until 2022.

H.3.1.5 C57.162 - Guide for the Interpretation of Moisture Related Parameters in Dry, Gas Insulated and Liquid Immersed Transformers and Reactors

The C57.162 PAR expires December 31, 2017. The standard is valid until 2018 and is Chaired by Tom Prevost

H.3.1.6 1276 Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Transformers

The 1276 PAR expires December 31, 2016 and an extension has been requeseted. The standard is valid until 2018 and is Chaired by Roger C. Wicks.

H.3.1.7 1538 IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid-Filled Transformer

The 1538 guide is valid until 2021 and is Chaired by Richard Marek. An amendment was approved in September 2015.

H.3.2 Working Group and Task Force Reports

H.3.2.1 Working group on PC57.162 – Guide for the Interpretation of Moisture Related Parameters in Dry, Gas Insulated and Liquid Immersed Transformers and Reactors – Tom Prevost

A meeting was held on October 24, 2016 for the working group on PC57.162 – Guide for the Interpretation of Moisture Related Parameters in Dry, Gas Insulated and Liquid Immersed Transformers and Reactors (Moisture in insulation systems)

Tom Prevost - Chair
Valery Davydov- Vice Chair
Deanna Woods – Secretary
Stephanie Denzer – Secretary for this meeting

Attendance:	Members:	39 of 88
	Guests:	49 guests with 8 requesting membership

The following guests requested membership

Roger Hayes	Marcos Ferreira
Shane Goydich	Kiran Vedante
Sheldon Kennedy	Kevin Sullivan
Jeffrey Ray	

The meeting was called to order at 11:00 am. Introductions of the Vice Chair and (temporary) Secretary were made.

Members of the working group present at the meeting were asked to stand and be counted to assess whether there was a quorum. We had 39 of 88 members present so we did not have a quorum. The chair noted that since we did not have a quorum, we could not do any official business.

The agenda of the meeting was presented for comment. No additional agenda items were suggested.

Meeting Agenda:
- Introduction of attendees
- Establishment of Quorum
- Approval of Agenda
- Approval of Minutes from March, 2016
- Call for Patent Claims
- Review of PAR
  - Project Scope
  - Project Purpose
  - Project Timeline
- Chair's Remarks

- Presentation, "Case Study: Investigation into High Risk Associated with Wet Oil Resulted in Transformer Failure", Valery Davydov
- Update on Task Force Activity

The following call for patents was shown to the members and guests. No one responded.

> If any individual believes that Patent Claims might be Essential Patent Claims, that fact should be made known to the entire working group and duly recorded in the minutes of the working group meeting.

The scope and purpose of the project were reviewed by the chair.

A request for volunteers to edit the document once the TF reports have provided their drafts was made. If anyone is interested, please contact Tom Prevost.

Valery Davydov gave a presentation "Case Study: Investigation into Transformer Failure and Positioning of On-Line Moisture Probes" for Task force 6. A question was presented by Roger Fenton and a response for follow up offline was given.

Task Force Reports;

Task Force 1 – Terminology and Definitions
Task Force Leader (Jeff Golarz)
Tom Prevost presented as Jeff was not present. Jeff has compiled all of the terminology and definitions that have been submitted by the task forces. This is ready to be included in the main document.

Task Force 2 – Measurement and evaluation of moisture-in-gas insulation parameters.
Task Force Leader – Tom Melle
Progress is being made, a presentation summary is available on the transformer committee website. The first draft of the chapter was requested to be completed by the end of January 2017.

Task Force 3 – Measurement and evaluation of moisture in – liquid insulation parameters.
Task Force Leader – Claude Beauchemin
CIGRE is currently working on this effort and should be completed 1Q or 2Q 2017 – we are hoping to utilize this information. A draft was requested by end of January 2017.

Task Force 4 – Measurement of moisture in solid insulation.
Task Force Leader – Ron Hernandez
The task force has completed its work and the chapter has been submitted to the WG chair for inclusion in the document. The chair complimented the members of the task force for completing their assignment.

Task Force 5 – Estimation of moisture in solid insulation using dielectric response methods
Task Force Leader George Frimpong
The task force has completed its work and the chapter has been submitted to the WG chair for inclusion in the document. The chair complimented the members of the task force for completing their assignment.

Task Force 6 – Inferring of moisture in solid insulation from measurements conducted in liquid or gaseous medium.

Task Force Leader – Valery Davydov
A presentation was given on the position of moisture sensors. It was suggested that the TF considers including into a draft a discussion on the issue of positioning of moisture sensors in the main oil circulation and away from it. A draft of this section should be ready by the end of January 2017.

Task Force 7 – Evaluation of aging and end of life of solid insulation parameters
Task Force leader – Roger Wicks
No update – draft to be completed by the end of January 2017.

Task Force 8 – Factory/workshop application of knowledge on moisture; establishing baselines
Task Force leader – Poorvi Patel
The task force has completed its work and the chapter has been submitted to the WG chair for inclusion in the document. The chair complimented the members of the task force for completing their assignment.

Task Force 9 – Field application of knowledge on moisture * Note: This section lists the risks associated with moisture
Task Force leader – Jim Thompson
The chair presented TF chair Thompson's summary of progress to date;

> "I am reviewing papers and guides on moisture risks including bubble evolution in oil, dielectric failure, and premature aging of paper. I authored the Cold Start VDE response curve in the C57.106-2015 Annex and can provide more details. Other guides already have bubble evolution risk information. I will search the IEEE Explore site for aging vs moisture in paper/oil systems. I hope to have a draft in two weeks. I still don't have e current C57.91 but will get a new C57 series CD after this meeting. Most of the text regarding risks will be discussion and references to C57 guides. I will also add a bibliography."

It was suggested that this document must include moisture levels associated with known risks. The chair commented that this should be included in the work of TF 9. The rough draft of this section to be completed by end of January 2017.

Task Force 10 –Moisture Migration, Distribution and Moisture Equilibrium Charts
Task Force leader – Bruce Forsyth
The task force received additional volunteers since last meeting and a scope has been developed.

TF 10 Scope:

This chapter presents the best known information related to

a) Moisture migration in insulation systems;
b) How moisture distributes throughout an insulation system;
c) Moisture equilibrium charts applicable to transformer insulation systems.

The initial focus will be on liquid-filled insulation systems, but an effort will be made to provide similar information for gas-filled insulation systems.

Oleg Roizman commented that basic adsorption isotherm curves for cellulose were developed in 1960 and came from the textile industry. He asked a question on whether or not to use these existing "Jeffries" curves or create new ones. The chair commented that the development of new adsorption curves, although preferred, may take too long for inclusion in this document. (Task force is looking for input from material suppliers)
The chair requested that all Task Forces complete their chapter draft by the end of Jan 2017.

This meeting was adjourned at 12:15pm

H.3.2.2 Working Group for Application of High-Temperature Materials IEEE P-1276 – Roger Wicks

Sheraton Hotel – Vancouver, BC Canada
Room – Grand Ballroom AB
October 25, 2016, 3:15 - 4:30pm

A. Welcome & Chairman's Remarks — R. Wicks

Roger opened the meeting at 3:15pm with a brief description of the scope of the Working Group. The chair reviewed the patent topic and there were no essential patented described for work in the area of this standard.

B. Circulation of Attendance Rosters — J. Arteaga

Circulated

C. Attendance for Quorum — J. Arteaga

19 members were in attendance meeting the quorum requirement of 18 members. The attendance will be reviewed and new members will be added if they meet current attendance requirements. The attendance will be recorded in the AMS system. The automated attendance records (scanning system) recorded 19 members and 60 guests.

D. Approval of Spring 2016 Meeting Minutes – Atlanta, GA — J. Arteaga

Mike Shannon made a motion to approve the minutes as written, John Luksich seconded it and these were unanimously approved without changes.

E. Approval of Meeting Agenda — R. Wicks

Eduardo Tolcachir made a motion to approve the agenda as written, Mike Shannon seconded it and these were unanimously approved without changes.

F. Status of PAR/Document — R. Wicks

The PAR of this standard was requested for extension for 2 year. The standard expires at the end of 2018.

G. Assignments from Last Meeting R. Wicks

The assignments for the elaboration of the draft are as follows. Chair requested groups to complete the draft work before the end of year.

Section 5 – Insulation-system temperature ratings, test procedures, and material aging qualification:
Chair - Roger Wicks
Volunteers – Mike Franchek, Ken McNeish, Tom Golner, David Stankes, Solomon Chiang, Joshua Verdell, Dave Sundin, Jinesh Malde, and Mohamed Diaby.

Section 6 – Insulating Materials.
Chair – Javier Arteaga
Volunteers – Clair Claiborne, Julio Caldeira, Patrick McShane, Dave Sundin, Attila Gyore, Chuck Stevens, Shane Goydich, Jinesh Malde, Dustin Davis, and Mike Shannon.

Section 7 – Description of high-temperature transformers.
Chair – Mike Franchek
Volunteers – Kurt Kaineder, Arup Chakraborty and Evan Langran.

Section 8 – Loading guidelines for high-temperature transformers.
Chair – John Luksich
Volunteers - Arup Chakraborty and Jinesh Malde

Section 10 – Heat run test and average winding temperature.
Chair – Juan Castellanos
Volunteers – Mike Franchek, Alan Sbravati

H.3.2.3 Working Group on C57-119 IEEE Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings – Gael Kennedy

The document is undergoing ballot resolution. It is still on track to be completed prior to the end of 2018. This working group did not meet during the Vancouver Conference.

Submitted by: Gael R Kennedy

H.4 Old Business

The chair stated that the Chinese Society of Electrical Engineers "Standard for lead exits, 1000 volts and above", has been referred elsewhere by the and will therefore not be addressed by this subcommittee.

Regarding the work of the "C57.154 Annex B Clause B.5 Recommendation" working group;

- Mr. Rick Marek provided a presentation explaining his concern that thermal class data in C57.154-2012 Annex B regarding cellulose in ester was based upon insufficient data. He agreed that the data shows some improvement of temperature life improvement, but that the specific level of improvement has not been established.

- Mr. Alan Svarti provided a presentation supporting the C57.154-2012 Annex B data. He presented a case that the data in Annex B is sufficient to establish curves which support the thermal classes indicated. He provided data points from unpublished data which was consistent with the data extrapolations in Annex B.

- Mr. Roger Thompson, chair of the subject working group, provided a summary of the working group's meeting and reported the working group's recommendation to form a task force to review annex B for possible amendment. He then made a motion as follows; "A new task force be formed to review the Annex for possible amendment". The motion was seconded by Mr. Tom Prevost.

- Mr. Svarti and Mr. Patrick McShane spoke against the motion. Mr. Thompson and Mr. Prevost spoke for the amendment.

- Mr. Thompson amended his motion as follows; "A new task force be formed to review Annex B of C57.154 for possible amendment". Provost seconded the amended motion.

- A vote of members was taken and the motion was approved with 57 yes, 3 no, and 1 abstention.

- The Chair asked that anyone desiring membership in the new working group notify him so that work can begin promptly.

H.5 New Business

Mr. Phil McClure stated that C57.165 now has an approved PAR. He is the chair of the working group and requested that interested others contact him.

H.6 Adjournment

Mr. Phil McClure made a motion for Amendment. Gail Kennedy seconded and there were no objections.

Respectfully submitted,

Samuel L. Sharpless
Secretary, Insulation Life Subcommittee