Annex G Insulating Fluids Subcommittee

Oct 19th, 2022
Charlotte, NC – Sheraton / Le Meridien Charlotte

Chair: Scott Reed
Vice-Chair: Jerry Murphy
Secretary: Alan Sbravati

1. **Introductions, Roll Call of Members for Quorum, Meeting Agenda Approval, S21 Minutes Correction and Approval, and Chair's Comments**

1.1 Chair's Opening Remarks:

a. Presentation of the Vice-Chair, Jerry Murphy, and the Secretary Alan Sbravati.

b. Reminded that the SC minutes are due Dec 2, 2022- WG and TF meeting minutes are due for submittal to the Insulating Fluids Subcommittee (IFSC) Secretary Alan Sbravati due within 15 days of their meetings (Nov 3rd, 2022).

1.2 **Roll Call of SC members: (**Quorum requirement: 26 minimum)

a. 38 Members signed in, from a total of 52 members. Quorum was achieved.

b. Total of 94 attendees. 35 Guests and 21 new attendees. Four guests requested membership, but none of those were eligible (attending last 3 meetings).

c. Registered Attendance:

First Name	Last Name	Role			
Jennie	Aldenlid	Guest	Marcos	Ferreira	Guest
Nabi	Almeida	Guest	Sanford	Fong	Guest
Jared	Bates	Guest	Bruce	Forsyth	Guest
Kevin	Biggie	Guest	George	Frimpong	Guest
Piotr	Blaszczyk	Guest	Rainer	Frotscher	Member
William	Boettger	Member	Carlos	Gaytan	Guest
Paul	Boman	Member	Ali	Ghafourian	Guest
Mike	Bonn	Member	Orlando	Giraldo	Guest
Jeremiah	Bradshaw	Member	Luis	Gonzalez	Guest
David	Calitz	Member	Scott	Gray	Guest
Juan Alfredo	Carrizales	Member	Niklas	Gustafsson	Guest
Edward	Casserly	Member	Attila	Gyore	Member
Juan	Castellanos	Member	Robert	Harper	Guest
Stuart	Chambers	Member	Roger	Hayes	Member
Luiz	Cheim	Member	Juan Carlos	Hernandez	Guest
Noah	Chesser	Guest	Traci	Hopkins	Guest
Larry	Christodoulou	Member	Karl	Jakob	Guest
Anthony	Coker	Guest	John	John	Member
Michael	Cook	Guest	Toby	Johnson	Member
Roberto	da Silva	Guest	Kurt	Kaineder	Member
Craig	DeRouen	Guest	Zan	Kiparizoski	Member
Don	Dorris	Member	Peter	Kleine	Guest
Jesse	Duffy	Guest	Stephanie	Mabrey	Member
Florin	Faur	Member	Jose	Machair	Guest

Jinesh	Malde	Member	Patrick	Rock	Guest
Brian	McBride	Guest	Mickel	Saad	Member
James	McGee	Guest	Fernando	Salinas	Guest
Toni	Mellin	Guest	Albert	Sanchez	Guest
Kent	Miller	Guest	Alan	Sbravati	Secretary
Mike	Miller	Guest	Pugal	Selvaraj	Guest
Justin	Minikel	Guest	Avijit	Shingari	Guest
Jose	Mora	Guest	Stephen	Shull	Guest
Gianetta	Morrow	Guest	Jonathan	Sinclair	Member
Jerry	Murphy	Vice-Chair	William	Solano	Guest
Ashmita	Niroula	Member	Brian	Sparling	Guest
Stephen	Oakes	Guest	Fabian	Stacy	Member
Anastasia	O'Malley	Guest	Gregory	Steeves	Member
Tyler	Parenti	Guest	Craig	Tennant	Guest
Dwight	Parkinson	Member	Ryan	Thompson	Member
Oscar	Pinon	Guest	Timothy	Tillery	Guest
Daniel	Posadas	Guest	Nick	Walder	Guest
Thomas	Prevost	Member	Evanne	Wang	Member
John	Pruente	Member	Zachery	Weiss	Guest
Timothy	Raymond	Member	Leon	White	Guest
Scott	Reed	Chair	William	Whitehead	Member
Sebastian	Rehkopf	Guest	Christopher	Whitten	Guest
Clemens	Reiss IV	Guest	Deanna	Woods	Member

1.3 Agenda Approval:

a. A motion for approval of the agenda was presented by Tom Prevost, second by Stu Chambers. Agenda was unanimously approved.

b. Scott presented a reminder about the submission of minutes deadline and mandatory training for WG officers.

1.4 Approval of minutes from the S22 and F21 meetings:

a. Since quorum was not achieved in the Spring 22 meeting, it was not possible to have a motion for approval.

b. A motion for approval of the S22 minutes was presented by Ed Casserly, second by Stephanie Mabrey. Minutes were unanimously approved.

c. A motion for approval of the F21 minutes was presented by Jeremiah Bradshaw second by Deanna Woods. Minutes were unanimously approved.

1.5 Chair's review of key IFSC Standards:

a. The chair reviewed the status of each of the 10 guides under the Sub-Committee Insulating Fluids.

b. C57.166 PAR's was extended in December 2023. This will supersede C57.106, C57.111, C57.121, C57.147, so no activity is required at this point for these standards.

c. C57.155 will. C57.637, C57.130, C57.139 will expire in 2025.

d. C57.104 did not meet this time.

e. C57.146, C57.155, C57.637 and C57.166 have active PAR's.

2. WG & TF Reports Presented at the SC Meeting

2.1.1 IEEE C57.166 Consolidation of Insulating Liquids Guides (PAR Expiration: Dec 2022)

2.1.1.1 WG Chair: Tom Prevost

2.1.1.2 The report of the WG Meeting was presented at the IFSC meeting by the chair:

a. There were 24 of 37 members present. Total of 68 attendees, including 44 guests. A membership quorum was achieved.

b. Call for patents was presented without any claim.

c. Chair informed the PAR goes until end of 2023, already counting a 2-years extension.

d. Purpose needs to be modified, for removing the reprocessing, reclaiming and replacement. Since the scope would be reduced, there would no need to go to Nescom. The word "Replacement" will be changed to "Retrofilling".

e. Document format was presented. All task forces completed their sections, the final document is assembled.

f. A question was raised about the switchgears, which was in the scope of C57.106. The subject belongs to a different committee and, due to this, it was removed from here.

g. Outstanding topics are:

   a. Abstract: Tom Prevost

   b. Introduction: Tom Prevost

   c. Finalizing membership list: Alan Sbravati

h. A ballot resolution group (BRG) will be assembled using the structure of the TF's for resolving the comments from the straw ballot.

i. The SA Ballot should be started after the S23 meeting. Voting for SA Ballot requires 2/3 majority.

j. After the Mandatory Editorial Coordination and the final ballot pool / ballot results are expected to be discussed during the F23 meeting.

See ***Appendix I*** for the F22 Minutes (unapproved) of C57.166 WG Meeting as submitted.

2.1.2 IEEE C57.146 IEEE Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers (PAR Expiration extended to Dec 2024)

2.1.2.1 WG Chair: Paul Boman

a. Attendance total 26, members 4, and 1 requested membership. The WG quorum of 6 was not present and no business was conducted at this meeting. Prior to the Fall 2022 meeting, 14-members were removed from the membership role prior due to non-attendance.

b. Call for essential patents – none at this time

c. Copyright usage was discussed during the meeting

d. Agenda – no additions were made to the agenda. Agenda was approved by unanimous approval.

e. Fall 2021 and Spring 2022 Working Group Minutes were not voted on because a quorum was not present. Planning to use an electronic ballot to approve all unapproved Meeting Minutes.

f. Copyright discussed – no copyright releases were discussed for the citation papers in the document

g. Par expires dec, 2024

h. After several discussion points, the intention of the group is:

    a. Get the data set

    b. Get in in the guide

    c. Align with 104

    d. Get it out for straw ballot

See ***Appendix II*** for the F22 Minutes (unapproved) of C57.146 WG Meeting as submitted.

2.1.3 TF C57.104 IEEE Guide for the Interpretation of Gases Generated in Mineral Oil-Immersed Transformers

2.1.3.1 TF Chair: Claude Beauchemin

a. The working group did not meet.

Appendix III has no minutes included.

2.1.4 C57.637 – Guide for the Reclamation of Mineral Insulating Oil and Criteria for Its Use

2.1.4.1 WG Chair: Stephanie Mabrey

a. 52 members with 22 (42%) were present. Quorum not achieved.

b. A decision was made to not address the topic of retro-fills in this document, but instead leave that to C57.166

c. Task Force leaders introduced themselves and shared a brief update of any progress made to date. Task Force actions planned before the Spring 2023 (Charlotte) meeting were defined as follows.

d. Each TF will begin completing their efforts and plan to submit their portions in advance of the next meeting

e. SM will arrange for a meeting with TF leaders to discuss last steps and prep for submission (targeting early January)

f. Any questions, comments, concerns, or needs should be brought to the attention of the Chair and Secretary in the interim

g. The meeting was adjourned by the Chair at 11:38 pm

See ***Appendix IV*** for the F22 Minutes (unapproved) of C57.637 WG Meeting as submitted.

2.1.5 C57.155 – Guide for Interpretation of Gases Generated in Natural and Synthetic Ester Liquid Type Transformers

2.1.5.1 WG Chair: Alan Sbravati

a. Attendance total 68, members 15 out of 28, guest 53 and 3 requested membership. Quorum was achieved.

b. No patent claim nor copyright issue were presented.

c. Activities after S22 meeting was presented on data collection, data anonymization of DGA data

d. Detailed discussion was about data procession

e. Presentations were showed about Data cleansing and Synthetic Data Creation

f. Agreement was achieved on the presented methods and process

g. Pilot data processing will be carried out on two data sets from volunteers

h. Meeting was adjourned at 16:28

See ***Appendix V*** for the F22 Minutes (unapproved) of C57.155 WG Meeting as submitted.

2.1.6 Task Force C57.139 – Guide for the Interpretation of Gases generated in Liquid Type Load Tap Changers

2.1.6.1 TF Chair: Rainer Frotscher

a. Attendance: Total: 41, Members: 16 out of 27 => quorum achieved. Guests: 27, 14 requesting membership.

b. Agenda approved by unanimous approval

c. Essential patent claims: none stated; Copyright requirements were shown.

d. S22 Meeting Minutes: motion to approve: S.Reed, 2nd R.Cox for unanimous approval

e. Chair presented List of Transformer manufacturers, some of them also produce LTCs.

f. Second list presented of LTC manufacturers and model types, with IEEE and CIGRE classification. List will help to anonymize origin of data sets

g. Chair presented Data template for LTC DGAs; explanation and discussion on data fields.

- Toni Mellin (Vaisala) asks for additional data field to identify the DGA method: either acc. to ASTM D3612 or IEC60567 – there are differences in the calculation of PPM values of 7% !

- How to handle variations of the same LTC model depending on vintage, and client modifications of preservation system along the lifetime

- oil changes vs. maintenance activity: respective data fields are present

h. Chair showed flowchart of planned data processing and owner protection; C.Beauchemin (TjH2b) shall act as trust person; discussion.

Tom Prevost (Weidmann) concerns about method: either we find somebody really independent within IEEE, or we ask for already classified data

i. Request for possible Data Providers:

- Don Doris(Nashville Electric Services) has data but cannot provide all requested information (columns)

- Ed teNyenhuis (Hitachi Energy)

- Ismail Guner (Hydro Quebec)

- Niklas Gustavsson (Hitachi Energy Sweden)

- Arturo Nunez (Mistras)

j. Meeting adjourned 6:00 pm

See ***Appendix VI*** for the F22 Minutes (unapproved) of C57.139 TF Meeting as submitted.

2.1.7 Working Group C57.130 – Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors

2.1.7.1 WG Chair: Bruce Forsyth

a. The meeting was well attended but quorum was not achieved (final numbers will be included in a revision of the meeting minutes).
b. No patent claim was presented.
c. Spring 2022 WG Minutes were reviewed with no requested changes, but not voted on because quorum was not present.
d. Chair reviewed the PAR and project milestones.
e. There was consensus that the basic approach of using gas generation rates to determine potential issues remains valid and will not be changed.
f. A long discussion took place regarding the feasibility of expanding the scope of the document to include ester liquids. A small Task Force will develop a proposal for information to request from manufacturers, users, and oil labs. After data has been received it will be studied to determine whether reliable gassing rates can be established for ester liquids. If yes, the scope and name of the document will need to be changed.
g. Scott Reed pointed out that IEEE needs to be the entity that collects the DGA data to ensure anonymity.
h. Several other items raised during the previous meeting for possible consideration in the revision were discussed. Most were considered impractical due to a lack of available data to support conclusions.

See ***Appendix VII*** for the F22 Minutes (unapproved) of C57.130 WG Meeting as submitted.

3. Old Business

a. Regarding the migration of TF2 previously associated with WG C57.154 from ILSC to IFSC, the previous TF Leader informed the group met before this meeting and decided they would like to reinstate the Task Force. Thus. A motion was presented by Alan Sbravati and second by Kurt Kaineder for creating a TF with the title "Develop a test method and suggest thermal classes for ester liquids". After some discussions around the title, this motion failed.

A new motion was presented for opening a Task Force to develop a test method to determine the maximum continuous operating temperature of insulating liquids. One more time it was seconded by Kurt Kaineder. As 22 members approved, 1 opposed and 3 abstained, the motion caried.

4. New Business

a. No new business.

5. Next IFSC Meeting:

March 22th, 2023 – Milwaukee, WI

6. Adjournment

The meeting was adjourned at 3:32 p.m.

Respectively Submitted, Alan Sbravati, Secretary IFSC

Unapproved Minutes from the F21 IFSC WG and TF meetings

Appendix I

Working Group for Acceptance and Maintenance of Insulting Liquids PC57.166

Tuesday, Oct 18, 2022
1:45 – 3:00 PM
Sheraton / Le Meridien Charlotte – Room Mecklenburg 3

Chairman Tom Prevost
Vice Chair Scott Reed
Secretary Alan Sbravati

The meeting was called to order at 1:49 pm by the Chair.

There were 24 of 41 members present. Total of 53 attendees, including 29 guests. A membership quorum was achieved.

Attendance list:

Juan Acosta	Guest	Dominic Pollaro	Guest
Elise Arnold	Guest	Thomas Prevost	Chair
Jeff Benach	Guest	John Pruente	Guest
Dominique Bolliger, Ph.D.	Member	Scott Reed	Vice-Chair
Paul Boman	Member	Rerry Reeder	Guest
Mike Bonn	Member	Sebastian Rehkopf	Guest
Jeremiah Bradshaw	Member	Diego Robalino	Member
Stuart Chambers	Member	Zoltan Roman	Guest
Larry Christodoulou	Guest	Mickel Saad	Member
Olivia Cordova	Guest	Alan Sbravati	Secretary
Stephanie Denzer	Member	Pugal Selvaraj	Member
Zachary Draper	Guest	Jonathan Sinclair	Member
Rainer Frotscher	Member	Brian Sparling	Guest
Lorne Gara	Guest	Thomas Spitzer	Guest
Robert Harper	Member	Gregory Steeves	Member
Andrew Holden	Member	Dean Summer	Guest
Miller Kent	Guest	Phil Swan	Guest
Zan Kiparizoski	Member	Troy Tanaka	Guest
Michelle Kutzleb	Guest	Risto Trifunoski	Guest
Aleksandr Levin	Guest	Alwyn Van Der Walt	Member
Lance Lewand	Guest	Evanne Wang	Member
Tiffany Lucas, P.E.	Guest	Leon White	Guest
Jinesh Malde	Member	William Whitehead	Guest
Kumar Mani	Member	Christopher Whitten	Guest
Brian McBride	Member	Roger Wicks	Guest
Ashmita Niroula	Guest	Malia Zaman	Guest
Parminder Panesar	Member		

Approval of Agenda
Motion for approving agenda presented by Stuart Chambers and second by Dominique Bolliger.
Agenda unanimously approved.

Approval of Spring 2022 Minutes
Motion for approving the minutes presented by Ed Casserly and second Ewanne Wang.
No discussions, minutes unanimously approved.

The chair presented the slides on the Call for Patents and no claims of essential patents was presented.

The chair presented the slides on Copyright Policy, also informing the participants the overall IEEE procedures for the meeting.

Chair informed the PAR goes untill end of 2023, already counting a 2-years extension.

Purpose needs to be modified, for removing the reprocessing, reclaiming and replacement. Since the scope would be reduced, there would no need to go to Nescom. The word “Replacement” will be changed to “Retrofilling”.

Document format was presented. All task forces completed their sections, the final document is assembled.

A question was raised about the switchgears, which was in the scope of C57.106. The subject belongs to a different committee and, due to this, it was removed from here.

Outstanding topics are:
Abstract: Tom Prevost
Introduction: Tom Prevost
Finalizing membership list: Alan Sbravati

With the publication of the ASTM D8240, the new liquids requirements for SE were concluded. All required values for the tables are finalized. The final document will be sent for a straw ballot by the end of November. Comments should be sent by the end of the year.

A ballot resolution group (BRG) will be assembled using the structure of the TF’s for resolving the comments from the straw ballot.

The SA Ballot should be started after the S23 meeting. Voting for SA Ballot requires 2/3 majority.

After the Mandatory Editorial Coordination and the final ballot pool / ballot results are expected to be discussed during the F23 meeting.

Motion to adjourn the meeting by Jinesh Malde, seconded by Jeremiah Bradshaw.

No new business.

Meeting adjourned at 2:46pm

Alan Sbravati, Secretary
Scott Reed, Vice Chair

Appendix II

Working Group C57.146 IEEE Guide for DGA in Silicone

Monday, October 17, 2022
11:00 AM to 12:15 PM
Sheraton Hotel, Charlotte NC
Minutes of Working Group Meeting

Chair Paul Boman / Vice Chair Lance Lewand
Secretary Vacant
Meeting on October 17, 2022, 11:00 AM to 12:15 PM at Sheraton, Charlotte NC

Attendance total 26, members 4, and 1 requested membership. The WG quorum of 6 was not present and no business was conducted at this meeting. Prior to the Fall 2022 meeting, 14-members were removed from the membership role prior due to non-attendance.

Meeting Attendance

Role	First Name	Last Name	Email	Company
Guest	Onone	Avansoma	0.avanoma@outlook.com	
Guest	Jeff	Benach	jeff.benach@megger.com	Megger
Chair	Paul	Boman	paul_boman@hsb.com	Hartford Steam Boiler
Member	Zachary	Draper	zhdraper@deltaxresearch.com	Delta-X Research Inc.
Guest	Marco	Espindola	marco.a.espindola@hitachienergy.com	Hitachi Energy
Member	Florin	Faur	florin.faur@prdec.energy	Prolec-GE
Guest	Todd	Felton	tfelton@mvadiagnoistics.com	MVA
Guest	George	Frimpong	george.k.frimpong@hitachi-powergrids.com	Hitachi Energy
Guest	Luis	Gonzalez	lgonzalez@canduct.com	
Guest	Traci	Hopkins	thopkins@h2scan.com	H2 Scan
Guest	Anurvdhdhs	Jhala	asjhala@transformerindia.com	
Vice-chair	Lance	Leward	llewand@doble.com	Doble Engineering Co.
Guest	Toni	Mellin	toni.mellin@vaisala.com	Vaisala
Guest	Curtis	Moore	thecurtismoore@gmail.com	
Guest	Jose	Morakinyo	jose.mora@globecore.com	
Guest	Oscar	Pinon	opinon@otcservices.com	OTC Services
Guest	Thomas	Prevost	tprevost@ieee.org	Weidmann
Guest	Alaor	Scorduzzi	alaor.scorduzzi@siemens-energy.com	Siemens Energy
Guest	Greg	Steeves	greg@baronusa.com	Baron
Guest	Herman	Vogel	vogel@tjh2b.com	TJH2b
Guest	Alan	Washburn	awashburn@burnsmcd.com	Burns & McDonnell
Member	Bill	Whitehead	bwhitehead@h2scan.com	H2Scan.Com Energy
Guest	Christopher	Whitten	christopher.l.whitten@hitachienergy.com	Hitachi Energy
Guest	Anand	Zanwar	anand.zanwar123@gmail.com	Siemens Energy
Guest	Igor	Ziger	igor.ziger@koncar-mjt.hr	KONCAR

Call for essential patents – none at this time
Copyright usage was discussed during the meeting
Agenda – no additions were made to the agenda. Agenda was approved by unanimous approval.

Fall 2021 and Spring 2022 Working Group Minutes were not voted on because a quorum was not present. Planning to use an electronic ballot to approve all unapproved Meeting Minutes.

Copyright discussed – no copyright releases were discussed for the citation papers in the document
Par expires dec, 2024
Data

- Work on getting rates of change and 90 and 95% percentile
- Large data source is not available, we have 4 data sources and possibly one additional source
- Another data source from Doble
- Oxygen level will affect the production of CO and CO2
- Preservation system and age
- Want to try to get rate of changes if possible, how do you define high and low
- Put it in the diagnostic discussion not the flowchart.

Aligning C57.146 Guide with current C57.104 Guide

- Duval triangle for silicone, We have copyright release from CIGRE
- Does not cover measurement uncertainty – is there a need to add a comment about. It is not a normal distribution, consult with 104 guide. Analytical analysis and the data set.

Silicone is more chemically identical compound than mineral oils which have a wider variety of molecular makeup.
Laboratory analysis should be 15% laboratory analysis by IEC.

Guide out guide and get straw ballot on it – limited to working group that provides an edited version of guide (informal balloting process) used to ferret out editorial and technical changes.

Action items

- Get the data set
- Get in in the guide
- Align with 104
- Get it out for straw ballot

Adjourned Meeting

Appendix III

TF Next Revision to C57.104: Guide for Interpretation of Gases Generated in Mineral Oil-Immersed

No meeting minutes

Appendix IV

Working Group C57.637 Guide for the Reclamation of Mineral Insulating Oil and Criteria for Its Use

Tuesday, October 18, 2022
11:00 AM – 12:15 PM
Charlotte

Minutes of Working Group Meeting

The meeting was called to order at 11:00 am by Chair Stephanie Mabrey. Scott Reed (Vice-Chair) and Andy Holden (Secretary) were also present.
Attendees:
The Working Group (WG) has 52 members with 22 (42%) were present.

1. Kevin Biggie
2. Paul Boman
3. Jeremiah Bradshaw
4. Edward Casserly
5. Larry Christodoulou
6. Stephanie Mabrey
7. Don Dorris
8. Marc Foata
9. George Frimpong
10. Lorne Gara
11. Ismail Guner
12. Robert Harper
13. Andy Holden
14. Jinesh Malde
15. Ashmita Niroula
16. Timothy Raymond
17. Scott Reed
18. Mickel Saad
19. Alan Sbravati
20. Jonathan Sinclair
21. Greg Steeves
22. Ed teNyenhuis

Present

27 members of the WG have missed two (2) consecutive meetings and will be removed if they do not attend the Spring 2023 meeting in person.

5 new members were added today after requesting membership and attending 2 consecutive meetings.

1. Mike Bonn
2. Stuart Chambers
3. Rainer Frotscher
4. Lance Lewand
5. Deanna Woods

We had 41 guests attend the meeting, and 12 have requested membership.

Due to the time constraints, attendees did not introduce themselves.
Agenda
1) Introduction
2) Review Copyright Notification
3) Review Call for Patents
4) Review Membership
5) Introduction of Task Force leaders and updates
Chair's Remarks:

Chairwoman Mabrey (SM) requested a call for patents and no claims were made.

Next, the Chair reviewed with the Task Force (TF) the IEEE's copyright policy, of which no comments were made.

A decision was made to not address the topic of retro-fills in this document, but instead leave that to C57.166

The Chair then asked each Task Force leader to introduce themselves and share a brief update of any progress made to date. The following Task Forces leaders presented.

- Task Force 1 – Overview, Normative References, & Definitions
  - Jeremiah Bradshaw
- Task Force 2 – Classification of Service Aged Oils (Liquids) & Criteria for Reuse
  - Jinesh Malde
- Task Force 3 – Types of Reconditioning & Reclamation Processes
  - Ed teNyenhuis & Dave Sundin (absent)
- Task Force 4 – Oil (liquid) Tests & Their Significance
  - Andy Holden
- Task Force 5 -- Editor at Large
  - Jinesh Malde & Ed teNyenhuis

Task Force 1 Update
- The group is in the final stages of a few small reviews and they will have their portion ready before the Spring 2023 meeting

Task Force 2 Update
- Work is mostly complete, and they will be ready to submit before the Spring 2023 meeting
- Clarity was gained around the term "volatile" added by Rainer Frotscher (RF) and he suggested removing that the LTC specific text he offered TF2
- Significant discussion about the impact for different reclamation methods on both natural and synthetic esters
  - Roberto Da Silva (RD), Stuart Chanmbers (SC), and Alan Sbravati (AS) all contributed significant information about the process, inhibitor levels, pour point depressants, and reclamation

Task Force 3 Update
- Work is nearly complete and they will be ready to submit before the Spring 2023 meeting
- (AS) took the lead with making additions have been made specific to natural and synthetic esters
- They did ask for help form anyone with experience reclaiming esters and Deanna Woods (DW) offered to assist

Task Force 4 Update
- Work is mostly complete, and they will be ready to submit before the Spring 2023 meeting

Task Force 5 Update
- No update

Task Force actions planned before the Spring 2023 (Charlotte) meeting:

- Each TF will begin completing their efforts and plan to submit their portions in advance of the next meeting
- SM will arrange for a meeting with TF leaders to discuss last steps and prep for submission (targeting early January)
- Any questions, comments, concerns, or needs should be brought to the attention of the Chair and Secretary in the interim

With no other business to address the meeting was adjourned by the Chair at 11:38 pm.

Appendix V

Working Group C57.155 – Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformers

Tuesday, October 18, 2022
15:15 – 16:30, Charlotte, NC USA
Minutes of Working Group Meeting

Chairman: Alan Sbravati
Vice Chair: Lance Lewand
Secretary: Attila Gyore

The meeting was called to order at 15:15 by the Chair.

There were 15 of 28 members present during the meeting, at time of the poll there were 14 members. There were 53 guests, 3 membership requests.
The quorum was achieved.

1. Attendance list:

1	Nabi	Almeida	Guest
2	Brian	Baumann	Guest
3	Edwin	Betancourt	Guest
4	Kevin	Biggie	Guest
5	**Paul**	**Boman**	Member
6	Mike	Bonn	Guest
7	**Jeremiah**	**Bradshaw**	Member
8	Jim	Cai	Guest
9	**David**	**Calitz**	Member
10	**Edward**	**Casserly**	Member
11	**Stuart**	**Chambers**	Member
12	**Luiz**	**Cheim**	Member
13	Anthony	Coker	Guest
14	Roberto	De Silva	Guest
15	Huan	Dihn	Guest
16	**Zack**	**Draper**	Member
17	Todd	Felton	Guest
18	**George**	**Frimpong**	Member
19	Rainer	Frotscher	Guest
20	Carlos	Gaytan	Guest
21	Luis	Gonzalez	Guest
22	Johnny	Guercero	Guest
23	**Attila**	**Gyore**	Secretary
24	**Robert**	**Harper**	Member
25	Andrew	Holden	Guest
26	Traci	Hopkins	Guest
27	Karl	Jakob	Guest
28	Anirudhdhsinh	Jhala	Guest
29	John	John	Guest
30	Kurt	Kaineder	Guest

31	Andrew	Larison	Guest
32	Aleksandr	Levin	Guest
33	**Lance**	**Lewand**	Vice-Chair
34	**Jinesh**	**Malde**	Member
35	Espindola	Marco	Guest
36	Mama	Mbouombouo	Guest
37	Brian	McBride	Guest
38	James	McGee	Guest
39	Toni	Mellin	Guest
40	Aaron	Meyers	Guest
41	Justin	Minikel	Guest
42	Jose	Mora	Guest
43	Jerry	Murphy	Guest
44	**Ashmita**	**Niroula**	Member
45	Jonas	Oliveira	Guest
46	**Parminder**	**Panesar**	Member
47	Tyler	Parenti	Guest
48	Poorvi	Patel	Guest
49	Rakesh	Patel	Guest
50	Vinay	Patel	Guest
51	John	Pruente	Guest
52	Timothy	Raymond	Guest
53	Perry	Reeder	Guest
54	Oliverio	Sanchez	Guest
55	Amitabh	Sarkar	Guest
56	**Alan**	**Sbravati**	Chair
57	Jonathan	Sinclair	Guest
58	Muhammad Abdullah	Sohail	Guest
59	Tim	Tillery	Guest

60	Risto	Trifunoski	Guest
61	Krishnamurthy	Vijayan	Guest
62	Herman	Vogel	Guest
63	Evanne	Wang	Guest
64	Matthew	Web	Guest

65	Zachery	Weiss	Guest
66	Leon	White	Guest
67	**Bill**	**Whitehead**	Member
68	Deanna	Woods	Guest

2. Previously circulated agenda

A. Welcome & Introduction
B. Attendance and Establishment of Quorum
C. Call for Patent Disclosure
D. IEEE Copyright Policy
E. Approval of Spring 2022 Minutes
F. Working Group Activities
   1. Task Force 1
      • Importing and cleansing the data → Luiz Cheim
      • Generating the synthetic data for sharing with the WG → Zack Draper
   2. Task Force 2 • Development of NEI parameters for Ester liquids
   3. Presentation of Ester DGA examples for the Annex
G. Discussions:
   1. Agreement on the data colleting proposed procedure
   2. Potential volunteers for a pilot on data collecting
H. Other Items for Discussion
I. Adjournment

3. The agenda of the meeting was presented by the chair.

4. Chair posted the Patent Claim. No claims were made.

5. Chair presented the copyright policy slides.

6. Chair gave a short summary on activities from last meeting in March 2022

7. Agenda for Fall 2022 was approved, motion: Jeremy Bradshaw, second: Ed Casserly

8. Spring 2022 Minutes was approved, motion: Jeremy Bradshaw, second: Luiz Cheim

9. Discussion on Task Force 1
Data gathering - Discussed data gathering methodology and to ensure data is maintained as confidential. Cleansing and formatting of the data and then redacting of identifying data. Much discussion on sharing of data. Luiz Cheim provided a short description of Python software to data cleansing with some of the of work to include:
Remove lines that include mineral oil
Remove lines with blank DGA
Remove lines with specific gravity with less than 0.91
Check the MVA values to make sure they are not kVA
Ambient Temperatures above 45C cannot be real so some conversion may be included.
Save the final datasheet as a CSV.

Zack Draper provided an in-depth discussion of the how to manage and increase data points involving the use of synthetic data points without compromising the percentile values of the original data and fit the distribution of the original data while retaining the lowest possible resolution. There was some question on even the need to add the synthetic data if there were enough data points (Timothy Raymond). Another subject discussed was to combine small data sets from various sources, so it becomes one large data set. Once collected and the data is in review, there will be a need to determine if there is a need to break it down into application specific criteria such as solar and wind installation, transmission and distribution and GSU.

There was an additional discussion on having each source calculating their own statistics and then just providing those values. Even though Python is an open-source program, members indicated that their companies may not allow it to be installed on their company computers. There are several ways around this that was discussed at the meeting.

Presentations were showed about Data cleansing and Synthetic Data Creation

Agreement was achieved on the presented methods and process

10. Discussion on Task Force 2, NEI
One of the new items suggested for the guide is the computation of NEIs for natural and synthetic esters. Since these liquids are chemically different than mineral oils, the same calculation cannot be used as in C57.104. Therefore, Kevin Wirtz is calculating the enthalpy of formation for natural esters and Russel Martin is the person calculating for synthetic esters. One item that was brought up was that the energy of formation does not represent the fault energy. The reason for the heavier use of NEIs in this guide as opposed to C57.104 is the amount of data received which was over 1 million data points. It is suspected thar only about 30,000 data points will be gathered, and numerous resampling of the apparatus will have not occurred yet as in mineral oil transformers.

11. Retrofilling
There was some discussion about retro-filled transformers (which contain a low percentage of mineral oil) and blended esters (mixtures of different esters) would not provide enough data points to provide any meaningful analysis and may only be discussed in the document as another application that has not yielded a population large enough for data mining.

12. Miscellaneous
The last discussion item to come up was the use of online data. It will be explored but not be included with the DGA lab data as it will skew the data just because of the sheer number of data points that will be produced via this method. It is possible to take yearly or biannual snapshots of the data and use them as single data points as in DGA lab analysis which is a more reasonable approach.

Paul Bowman had already provided one case study and Lance Lewand offered to provide an additional case study.

13. Pilot Data Processing
Pilot data processing will be carried out on two data sets from volunteers: Jeremy Bradshaw from USBR and A. S. Jhala from T&R India

14. New Business/Other Items for Discussion: No new business.

15. The meeting was adjourned at 16:28, on time, motion: Stuart Chambers, second: Jinesh Malde

Attila Gyore, Secretary
Alan Sbravati, Chair

Appendix VI

Task Force C57.139 – Guide for Interpretation of Gases Generated in Liquid Type Load Tap Changers

Tuesday, October 18, 2022
4:45 PM to 6:00 PM
Charlotte (NC)

Minutes of Task Force Meeting

Chair Rainer Frotscher
Vice Chair John Pruente
Secretary Paul Boman
Meeting: October 18, 2022, Charlotte (NC), 4:45 PM to 6:00 PM
Attendance record: Total: 45, Members: 18, Guests: 29, with 13 requesting membership.
Attendees list: see end of these Minutes.

Agenda
Topics:

- Welcome
- Approval of Agenda
- Membership / Quorum
- Call for Patent Claims / IEEE SA Copyright Policy
- Approval of Meeting Minutes S22
- List of LTC Manufacturers – Models – Classification
- Data Base Template
- Data Flow and Protection
- Revision of C57.139 Document – Task Forces
- Adjourn Meeting

Minutes
Agenda: unanimously approved
Roster showed 27 members, with 18 attending => Quorum achieved.

Attendees list:

First Name	Name	Affiliation	Role
Jennie	Aldenlid	Hitachi Energy	Guest
Bo	Blackmon	GPC	Guest
Paul	Boman	The Hartford Steam Boiler	Secretary
Edward	Casserly	Ergon	Guest *)
Larry	Christodoulou		Member
Michael	Cook	Dominion SC	Guest

Ranoy	Cox	GE-Med	Guest *)
Roberto	da Silva	Cargill	Guest
Don	Dorris	Nashville Electric Service	Member
Zack	Draper	Delta-X Research	Guest *)
Jesse	Duffy	Nashville Electric Service	Guest *)
Samragni	Dutta Roy	Siemens Energy Inc.	Guest *)
Florin	Faur	Prolec GE Waukesha	Member
Hugo	Flores	Hitachi Energy	Member
Marc	Foata	MR	Guest
Joe	Foldi	F&A	Guest
Rainer	Frotscher		Chair
Ismail	Guner	Hydro-Quebec	Guest *)
Niklas	Gustavsson	Hitachi Energy	Member
Attila	Gyore	M&I Materials	Member
Anirudhdhsinh	Jhala	Transformers & Rectifiers (India) Ltd.	Guest *)
Zan	Kiparizoski	Howard Industries	Member
Axel	Kraemer	MR	Guest
Bernhard	Kurth	MR	Guest
Olivier	Lejay	Huaming TC	Member
Stephanie	Mabrey	Weidmann	Guest *)
Toni	Mellin	Vaisala	Guest *)
Jose	Mora	Globecore	Guest
Ali	Naderian	Metsco	Guest
Ashmita	Niroula	Ergon Inc.	Guest *)
Arturo	Nunez	Mistras	Member
Thomas	Prevost	Weidmann	Guest
John	Pruente		Vice-Chair
Scott	Reed	MVA	Member
Perry	Reeder	GE Power Transformer	Member
Sebastian	Rehkopf	MR	Guest *)
Alan	Sbravati	Hitachi Energy	Guest
Jonathan	Sinclair	PPL Electric utilities	Member
William	Solano	Reinhausen Mfg.	Guest *)
Ed	teNyenhuis	Hitachi Energy	Member
Cole	Van Dreel		Member
Nick	Walder	Eaton	Guest
Christopher	Whitten	Hitachi Energy	Member
Baitun	Yang	R.E.Uptegraff	Guest *)
Joshua	Yun	Virginia Transformer Corp.	Guest *)

*): requesting membership

Chair showed Essential Patent Claims, none stated.

Copyright requirements shown.

Spring 22 Meeting Minutes: motion to approve by Scott Reed, 2nd Randy Cox => unanimous approval

Chair reported from several TEAMS meetings with Z.Draper and J.Pruente during the summer months, to prepare tools and template for a LTC DGA database – which is one of the major tasks of this WG. Several EXCEL Tables have been set up in these meetings, which were presented.

a) List of Transformer manufacturers, some of them also produce LTCs. This list will help to separate trsf manufacturers from LTC manufacturers.

b) List of LTC manufacturers and their models/types, classified acc. to IEEE and CIGRE, and assigned if in-tank or compartment type. List will help to cluster data sets.

c) Data template for LTC DGAs. The data fields were explained, and there was some discussion.

- T. Mellin (Vaisala) asks for additional data field to identify the DGA method: either acc. to ASTM D3612 or IEC60567 – reason: different calculations of ppm values lead to deviations of 7% !
- How to handle variations of the same LTC model depending on vintage, and client modifications of preservation system along the lifetime
- oil changes vs. maintenance activity: respective data fields are present.
- Size: As data template comprises 46 columns, it was asked to mark the data fields which are absolutely necessary for data processing. Chair replies that, by doing so, all data providers would only fill out these fields and neglect the others (e.g. no. of LTC operations). For a successful data processing, it is important to collect as much additional information as possible.

Protection of data: Chair showed a flowchart of the planned data processing and protection of data. C.Beauchemin (TjH2b) was proposed to act as trust person who receives the data and anonymizes them. Only he holds a synonym table which allows a backtracing to the origin of the data. Intense discussion followed.

T.Prevost (Weidmann) concerns about this approach, as is it similar to the method used in C57.104, which, after data have been evaluated, led to the destruction of the database. This should be avoided here. C.Beauchemin is not regarded as independent. Two options were identified:

a) find a really independent trust person (within IEEE, or from an university), or

b) we ask for already classified (and so anonymized) data. This requires good instruction to potential data providers.

Help was offered by S.Reed and T.Prevost. Further discussions are necessary.

Appeal for possible Data Providers: as operational data are requested, DGA laboratories are not the first choice. It would be good if data would be delivered by:

- LTC equipment owners / Utilities
- LTC manufacturers
- Database Hosts
- (Laboratories).

Members who have indicated to contribute data:

- Don Doris (Nashville Electric Services) has data but cannot provide all requested information (columns)
- Ed teNyenhuis (Hitachi Energy)
- Ismail Guner (Hydro Quebec)
- Niklas Gustavsson (Hitachi Energy Sweden)
- Arturo Nunez (Mistras)
- Michelle Kutzleb (TjH2b)
- Paul Boman (HSB)
- Rainer Frotscher (Reinhausen)

Due to lack of time, planned revisions of the Guide were not discussed, and no Task Forces were installed => postponed to next meeting.

Meeting adjourned at 6:00 pm.

Appendix VII

Working Group C57.130 – Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors

Tuesday, March 29, 2022
October 18, 2022, 9:30 AM – 10:45 AM EDT
Charlotte, North Carolina

Minutes of Working Group Meeting

Activity	**:**	WG PC57.130
Document Title	**:**	Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors
Meeting Date	**:**	October 18, 2022, 9:30 AM – 10:45 AM EDT
Meeting Location	**:**	Charlotte, North Carolina
Chair	**:**	Bruce Forsyth
Vice-Chair	:	Jinesh Malde
Secretary	**:**	Javier Arteaga

1. Call to Order

The meeting was called to order at 9:30 AM on October 18, 2022.

2. Chair's Remarks

2.1 Introduction and Attendance Sheets

Attendance rosters were circulated. Attendance records are not available at the time these minutes were written and will be added in a revision before the next meeting.

A count of members in attendance determined a quorum was not present. The Chair announced the group will continue with discussion topics and any decision made by this group will be subject to approval of a quorum at a later time.

Table 1 lists the current membership list.

Table 1: Voting Membership Attendance

Member Name	Affiliation	Role	Present?
Adams, Kayland	Prolec-GE Waukesha	Member	
Aikens, Tom	Virginia Transformer	Member	

Member Name	Affiliation	Role	Present?
Almeida, Nabi	Prolec-GE USA	Member	
Alonso, Mario	Georgia Transformer	Member	
Ansari, Tauhid	Hitachi Energy	Member	
Antosz, Stephen	Consultant	Member	
Arnold, Elise	SGB-Germany	Member	
Arteaga, Javier	Hitachi Energy	Member	
Beaudoin, Jason	Weidmann Electrical Technology	Member	
Boettger, William	Boettger Transformer Consulting LLC	Member	
Bohrn, Josh	Siemens Energy	Member	
Botti, Michael	Hyosung HICO	Member	
Bradshaw, Jeremiah	Bureau of Reclamation	Member	
Calitz, David	Siemens Energy	Member	
Castellanos, Juan	Prolec GE	Member	
Chakraborty, Arup	Delta Star Inc.	Member	
Clarke, Allen	Delta Star Inc.	Member	
Davis, Eric	Burns & McDonnell	Member	
Debass, Samson	EPRI	Member	
Draper, Zachary	Delta-X Research	Member	
Faur, Florin	Prolec GE Waukesha	Member	
Forsyth, Bruce	Bruce Forsyth and Associates PLLC	Chair	
Garcia, Eduardo	Siemens Energy	Member	
Griesacker, Bill	Duquesne Light	Member	
Hollrah, Derek	Burns & McDonnell	Member	
Jensen, Nick	Delta Star Inc.	Member	
Joshi, Akash	Black & Veatch	Member	
Kazmierczak, Jerzy	Hitachi Energy	Member	
Kirchenmayer, Egon	Siemens Energy	Member	
Lewand, Lance	Doble Engineering	Member	
Malde, Jinesh	M&I Materials Inc.	Vice-Chair	
Murray, David	TVA	Member	
Musgrove, Ryan	Oklahoma Gas & Electric	Member	
Patel, Nitesh	Hyundai Power Transformer	Member	
Patel, Sanjay	Royal Smit Transformers	Member	
Reed, Scott	MVA	Member	
Sahin, Hakan	Virginia Transformer Corp	Member	
Sarkar, Amitabh	Virginia Transformer Corp	Member	
Schrammel, Alfons	Siemens Energy	Member	
Sinclair, Jonathan	PPL Electric	Member	
Skinger, Kenneth	Scituate Consulting, Inc.	Member	
Som, Sanjib	PTTI	Member	
Staley, Brad	Salt River Project	Member	
Thompson, Ryan	Burns & McDonnell	Member	
Tolcachir, Eduardo	Tubos Trans Electric	Member	

Member Name	Affiliation	Role	Present?
Varghese, Ajith	Prolec GE Waukesha	Member	
Varnell, Jason	Doble Engineering	Member	
Wallach, David	Duke Energy	Member	
Zemanovic, Kyle	Eaton	Member	
Zibert, Kris	Allgeier Martin	Member	
Ziparizoski, Zan	Howard Industries	Member	

Table 2: Guest Attendance List

Guest Name	Affiliation*

*An asterisk identifies a guest who requested membership.

2.2 Participant Behavior

The Chair showed and briefly reviewed the IEEE SA slides related to participant behavior in the individual Working Group process. There were no comments.

2.3 Essential Patent Claims

The Chair showed and briefly reviewed the IEEE SA slides related to Essential Patent Claims. The Chair provided an opportunity for participants to identify patent claim(s) or patent application claim(s) and/or the holder of patent claim(s) or patent application claim(s) of which the participant is personally aware and that may be essential for the use of this standard. No claims were made.

2.4 Copyright Policy

The Chair showed and briefly reviewed the IEEE slides related to Copyright Policy. There were no comments.

3. Review of Agenda

The proposed agenda (see Figure 1) was shown. The Chair asked if there were any requested changes to the agenda. None were requested and as such the agenda was considered approved.

PRELIMINARY MEETING AGENDA

IEEE PES Transformers Committee
Insulating Fluids Subcommittee

Working Group PC57.130

Location: Charlotte, North Carolina
Tuesday, October 18, 2022 | 9:30 AM – 10:45 AM EDT

Chair: Bruce Forsyth **Vice Chair:** Jinesh Malde **Secretary:** Javier Arteaga

1. Call to Order
2. Chair's Remarks
    a. Distribution of Attendance Sheets
    b. Participant Behavior
    c. Essential Patent Claims
    d. Copyright Policy
3. Review of Membership & Quorum
4. Review and Approval of Agenda
5. Approval of Minutes of Last Meeting
6. Review of PAR
7. Discussion of PC57.130 Project Milestones
8. TF Report (feasibility of including ester liquids) – Lance Lewand
9. Discussion of content…desired changes
10. Unfinished Business
11. New Business
12. Adjournment

Figure 1: Proposed Agenda

4. Review of PAR

The Chair reviewed the approved the PAR scope and purpose.

The approved Scope is as follows:

> *"This document defines evaluation procedures and guidelines for acceptable levels of gases generated in conventional mineral oil-filled transformers and reactors during factory temperature rise tests."*

The approved Purpose is as follows:

> *"The purpose of this Guide is to provide guidance in the application of dissolved gas analysis (DGA) to transformers and reactors subjected to factory temperature rise tests. This document consists of*

evaluation procedures and guidelines for acceptable levels of gases generated in conventional mineral-oil filled transformers and reactors during factory temperature rise tests."

5. Discussion of PC57.130 Project Milestones

The Chair reviewed the basic milestones for the project as follows:

Identify revision needs; form TF groups .....March 2022 – Oct 2022
Document development.....Mid 2022 – Fall 2024
Submit to SC for sponsor ballot approval.....Fall 2024
Begin Sponsor ballot process (several steps).....Late 2024
Ballot resolution & re-ballot.....Early 2025 – Mid 2025
Submission of approved document.....Fall 2025

It was noted that the PAR expires at the end of 2026, but since the current document expires at the end of 2025 it is necessary to accelerate the work and finish before the end of 2025.

6. Task Force Reports

6.1 TF-1 Feasibility of Including Ester Liquids (Lance Lewand)

Lance Lewand discussed a proposal to request information from data holders related to gas generation during temperature rise tests on transformers filled with an ester liquid. A long discussion took place regarding the information that would be necessary to develop statistically reliable recommendations. Several suggestions were received, and Lance agreed to review all suggestion and compile a list of recommended questions to include in a questionnaire to data holders.

Scott Reed, IFSC Chair, noted that other groups have either requested data in the past, or are in the process of generating similar data requests, and he asked that the TF hold off on sending any data requests until a format for receiving the data can be developed with the assistance of IEEE to avoid including any information that is not absolutely necessary (i.e. commercial or manufacturing information) and to protect data owner privacy.

7. Content Discussion

The Chair led a review of suggestions received during the previous meeting regarding proposals for new information to be included in the Guide. A summary of discussions and is as follows:

- **Ester liquids**. Should the scope be expanded to include ester liquids?
  Consensus: Yes, provided a statistically reliable set of data can be collected to achieve reliable recommendations.

- **Gassing during overload tests**. A participant asked whether any generation limits are included for overload tests, and if not, should the document be expanded to include such limits.

Consensus: Overload tests are not standardized, so developing recommendation is not practical. This will not be pursued further.

- **Gassing during other tests**. A participant asked if the document should be expanded to provide gas generation limits for other tests, such as dielectric tests.
  Consensus: This would be outside the scope of this Working Group. This will not be pursued further.

- **Are the existing limits still valid?** A participant asked whether industry experience since the current document was published still supports the generation limits contained in Table 2.
  Consensus: No information has been presented to suggest the existing limits are not valid. This will not be pursued further.

- **Is the fundamental approach still valid?** A participant asked whether the basic approach of analyzing generation rates as described in the current document is still considered the best approach.
  Consensus: There was general agreement that the approach is acceptable, and if the document is expanded to include ester liquids new tables similar to Table 2 should be introduced as necessary.

- **Does the document apply to full current and full voltage tests on load tap changers (LTC)?**
  Consensus: It was generally agreed the gas generation limits described in the current document are for temperature rise tests on the main transformer only and do not apply to special load current or voltage tests that focus on LTC operation. This will not be pursued further.

- **Guidelines for reporting methods and duration of temperature rise test.** A participant recommended guidelines be introduced to document the specific procedure(s) followed during the temperature rise tests.
  Consensus: It was generally agreed that providing such information may be beneficial.

- **Consideration for higher temperature transformers.** A discussion took place regarding the applicability of the Guide to transformers with non-standard temperature rise ratings (e.g., 75 °C rise transformers).
  Consensus: It was generally agreed that this Guide applies to transformers designed and tested according to IEEE Std C57.12.00™ and does not apply to transformer with non-standard temperature rise ratings. This will not be pursued further.

- **Separation of gasses from hydrocarbon component.** A few comments were made suggesting there may be data supporting the separation of one or more gas from the hydrocarbon group (methane, ethane, ethylene).
  Consensus: This will depend upon the data received and whether there is sufficient data to make a reliable recommendation.

- **Data supporting the original values in Table 2.** There were a few comments about the data that was used to generate the existing limits in Table 2. Specifically, what was the source of the data and is the data still available?

Chair's Comment: The data supporting the original values in table 2 is not available.

- **Should columns be added to Table 2 with limits for various cooling modes (e.g., ONAN, ONAF, etc.**). A participant felt adding columns to Table 2 with separate limits for different cooling modes would be beneficial.
  Consensus: The data is not available to be able to develop reliable limits for different cooling modes. This will not be pursued further.

- **Adding recommended actions.** The current Guide lists gas generation rate limits with three condition levels (Condition I - No problem detected; Condition II - Possible problem; Condition III - Likely problem). A participant stated it would be beneficial to expand the Guide to provide recommendations regarding investigative steps to take for conditions II and III.
  Consensus: There was general agreement that adding a few actions may be useful, but that it remains the responsibility of the manufacturer to investigate and resolve any issues.

- **Time period between each heat run stage.** Some participants expressed concerns that the period of time between the completion of each heat run stage and the collected liquid sample should be defined better than in the current standard.
  Consensus: Defining the temperature rise test is outside the scope of this WG. However, this WG can develop recommendations to be passed on to the appropriate WG for consideration.

8. Unfinished Business

No unfinished business topics were raised for discussion.

9. New Business

No new business topics were raised for discussion.

10. Adjournment

The meeting adjourned at 10:45 AM.

Prepared and submitted by,

Bruce Forsyth
Chair

November 18, 2022