Annex G Insulating Fluids Subcommittee

March 23, 2016
Memphis, TN

Chair David Wallach
Vice-Chair Jerry Murphy
Secretary C. Patrick McShane

G.1 Introductions, Roll Call of Members for Quorum, Meeting Agenda Approval, F13 Minutes Approval, and Chair's Comments

G.1.1 Chair's comments:

a. S16 meeting chaired by Jerry Murphy Vice-Chair, as the Chair David Wallach was unable to attend. Patrick McShane, Secretary was present.
b. A message from the Chair stated that there is an invitation made to the TC's WGs and TFs to submit a poster summarizing their current activities for showing at the Dallas T&D meeting Poster Session. Susan McNelly will be there. Patrick McShane asked could the SCIF make a submittal to cover its WG and TFs. Susan stated the proposal did not mention SCs but would check as she sees no reason why that would not be acceptable.

G.1.2 Roll Call of SC members: (Quorum requirement: 25 minimum)

a. Quorum requirement was achieved, with 24 members in attendance at the time of the roll call. When the visual count was made, 24 members were present. However, eventually 33 members and 54 guests signed the roster. One of the three persons that had requested and eligible for membership status if present at roll call, OSCAR PINON and he was welcomed as the SCIF newest Member.

G.1.3 Agenda Approval:

a. SC Vote Outcome: The SCIF F15 agenda approved by Deanna Woods, seconded Kent Miller seconded unanimously,

b. Dave Sundin made a motion to approve the F15 SCIF minutes including a friendly amendment to add two missed guest in the reported count in the posted unapproved. Luiz Cheim seconded the motion. The Members unanimously approved it.

G.1.4 Corrections and Approval of minutes from Spring 2014 meeting in San Antonio, TX:

a. SC Vote Outcome: Dave Sundin made a motion to approve the F15 SCIF minutes including a friendly amendment to add two missed guest in the reported count in the posted unapproved. Luiz Cheim seconded the motion. The Members unanimously approved it.

G.1.5 WG & TF Reports Presented at the SC Meeting

G.1.5.1 C57.104 – IEEE Guide for the Interpretation of Gases Generated in Oil – Immersed Transformer (PAR Expiration: 12/31/17)

WG Chair - Rick Ladroga, Vice-Chair - Claude Beauchemin

The report of the WG Meeting was presented at the SCIF meeting by Claude Beauchemin.

The quorum achieved.

Michel Duval made a presentation on advantages and limitations of fault identification methods of DGA.

The meeting reviewed new section 7 of the guide of which was the subject of several conference calls since F15. They didn't finish the review during meeting. The content of the tables were focused on, particularly importantly steady state values table with several alternative proposed. A poll will be sent out to the WG on the alternatives and corrected tables. Also a flow chart for handling data needs re-work.

See ***Annex I*** for the Minutes (unapproved) of C57.104 WG Meeting as Submitted

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G.1.5.2 IEEE C57.147 Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers

WG Chair: Patrick McShane, Vice-Chair: Clair Claiborne, Secretary: Jim Graham

The WG Report at the Sub-Committee Meeting: Presented by Patrick McShane:

Since last meeting, PAR revision requested per WG approved motion of the F15 meeting, and approved by NESCOM in late January. Invitation to join voting pool was issued and Draft 2.0 MEC submitted and reviewed by IEEE SA. Draft 3 based on feedback from the MEC review was released for vote. Currently just over 50% of elgible voters have done so, with 90% approval rate, 63 comments (mostly editorial).s

A few technical comments were discussed, primarily some disagreement on what is recommended maximum temperature for surfaces in contact with the insulating liquid during processing. Also a suggestion was made to expand the Introduction of the Guide to provide more background on the Guide history and purpose of the revision. The WG Chair requested those who joined the pool to vote before the deadline.

Jerry Murphy reiterated the need to vote if you signed up in the ballot pool. Due 3/31.

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See ***Annex II*** for the Minutes (unapproved) of C57.147 WG S15 Meeting as Submitted

G.1.5.3 TF on Consolidation of Insulating Liquid (Fluid) Guides

Chair: Tom Prevost

The TF Report given at the Sub-Committee Meeting by Tom Prevost:

Quorum was achieved. Attendance included 63 guests, 12 requested membership on the TF. However, the Chair stated since the TF will make a transition to WG the application will apply for WG member status.

Dave Sundin, mentioned that it appears that two alternate insulating liquid Guides will expire prior to the formation of the Consolidation Guide. Dave asked, what action is recommended for their respective working groups? Tom Prevost responded, saying he will check with IEEE for SA rules. He stated the best case estimate to publish the consolidated guide by 2020. Jim Graham will also check with IEEE SA. Jerry Murphy stated one option is to just let them expire. Matt Ceglia of IEEE confirmed that the expiration dates is a hard stop of IEEE SA Active Status and the Guides, although would be classified as "inactive" would none-the-less be available for reference and purchase from IEEE. He added that once the Consolidated Guide is published, the other existing Guides would be superseded immediately. Patrick McShane stated that some brought up fact there is no IEEE existing synthetic ester maintenance guide, only an ASTM guide for new fluid is in works. Tom thinks the WG can coincidentally develop a synthetic maintenance guide while consolidating the existing guides.

Tom Prevost asked: "Are we ready to request PAR and to work on scope and purpose?" He then made a motion for SCIF to approve formation of WG for developing a consolidated guide for 5 insulating liquid standard guides. Clair Claiborne seconded. The motion passed.

See **Annex III** for the S16 Minutes (unapproved) of TF Consolidation of Insulating Liquid Guides as submitted.

G.1.5.4 TF on Particle Count Limits in Mineral Oil

Chair: Mark Scarborough, Secretary: Paul Boman

Mark Scarborough reported: The TF did not meet. What transpired since F15 included sending out a survey to approve the TF report that was written. 27 members, a majority, approved. Susan McNelly had many good editorial comments. The report has been submitted for approval. No consensus to use or not to consider particle count in insulating liquids is stated in the report.

Luis Cheim: Stated that the report seems to focus only on new transformers. Mark responded that was what was in the original purpose.

Motion was by Mark to present as the completed report. Jim Thompson seconded.

Tom Prevost asked; where is the report going to go? The response by Jerry Murphy was that there is now a placed for white papers on the web site. Susan McNelly indicated the section included tutorials and white papers now (including the SC Stds Insulating Liquids Terms white paper).

Motion carried unanimously to approve the report, and for posting. TF is closed..

G.2 New Business

a. C57.12.00 - A comment was submitted during recirculation ballot, but was deemed out of scope. It is not clear why? Matt Ceglia stated that during re-ballot process, a comment might be a non-modifiable part of the draft, aka "out of scope". Since the comment pertains to insulating liquids, the advisement was submitted to the SCIF Chair. Per Jim Graham, the purpose is that if the SCIF considers the comment has merit, it can make a suggestion to the next revision of C57.12.00 WG to accept the comment. Jim suggested that the SCIF add this subject as an agenda item as old business for the F16 meeting.
b. Patrick McShane stated that it is his understanding that IEEE SA suggests that proper procedure for ballot resolution is for the BRC revised draft be approved by the WG Members prior to the recirculation vote. There has been some confusion on that policy in the past. That is the policy the WG will follow for PC57.147.
c. Under the S16 New Business Agenda, Don Platts was scheduled to give a 30 minute power point presentation on issues of negative tank pressure causing air entry during insulating liquid sampling procedures. Unfortunately, discussion of the other items of the meeting agenda ran long, and the power point presentation could not be made in the short remaining time. So Don provide the "5 minute elevator speech" instead. He stated that field testing procedure for transformers exists to determine if there is a positive tank pressure. However, there is a potential issue that the procedure itself can cause air to flow into the transformer. That problem can be eliminated using proper type of valves. Don advised he will be putting full presentation at the next ASTM D27 meeting.

G.3 Adjournment

The motion passed unanimously.

Respectively Submitted, Patrick McShane, Secretary SCIF

Unapproved Minutes from the S16 SCIF WG and TF Meetings

Annex I – WG C57.104 Minutes

IEEE Guide for the Interpretation of Gases Generated in Oil – Immersed Transformers

Tuesday, March 22, 2016

Atlanta, Georgia, USA

Minutes of WG Meeting

The meeting was called to order at 4:45pm by Vice Chair Claude Beauchemin. Secretary Susan McNelly (writer of Minutes) was also present.

There were 50 of 77 members present. There were 53 guests, and 10 guests requesting membership. A membership quorum was achieved. The WG does plan to meet at the Fall 2015 Transformers Committee Meeting in Vancouver.

The following guests requesting membership were:

Marcos Ferreira	Jeffrey Ray
Roger Hayes	Justin Turner
Branimir Petosic	Michel Veillette
John Pruente	Deanna Woods
Jimmy Rasco	Kwasi Yeboah

All of the above will be added as WG members.

Agenda

1. Attendance Roster Circulation
2. Member Roll Call & Quorum Check
3. Approval of the Fall, Memphis minutes
4. Presentation on Fault Identification Methods – Duval
5. Document Status

a. Determine number of methods to be referenced

b. Discuss expansion of Table 1 and Table 2

6. New Business

7. Adjournment

Introductions of the Vice Chair and Secretary were made. Attendees were asked to introduce themselves and indicate their affiliations when making comments or asking questions.

List of Meeting Attendees is provided below. Those identified in bold are WG Members in attendance.

Don Ayers
Claude Beauchemin
James Blackmon, Jr.
Paul Boman
Stephan Brauer
Juan Castellanos
Jonathan Cheatham
Luiz Cheim
Larry Christodoulou
C. Clair Claiborne
Paul Cox
John Crouse
Frank Damico
Mohamed Diaby
Don Dorris
James Dukarm
Michel Duval
Pierre Feghali
Marcos Ferreira
Norman Field
Anthony Franchitti
George Frimpong
Shawn Galbraith
Lorne Gara
James Gardner
Jeffrey Golarz
Thomas Golner
Alexander Golubev
James Graham
Attila Gyore
Suh Joon Han
Roger Hayes
Fredi Jakob
Ted Johnstone
Arvin Joshi
Ken Kampshoff
Zan Kiparizoski
James Kilgore
Randall Kyle
Kerry Livingston
John Luksich
Mike Lau
Shawn Luo
Kumar Mani
Libin Mao
Terence Martin
Douglas McCullough
James McIver
Kenneth McNeish
Susan McNelly
Emilio Morales-Cruz
Jerry Murphy
David Murray
Ryan Musgrove
Paul Mushill
Anthony Natale
Jeffrey Neiman
Joe Nims
Jayme Nunes, Jr
Arturo Nunez
Poorvi Patel
Brian Penny
Nicholas Perjanik
Alan Peterson
Branimir Petosic
Oscar Pinon
Donald Platts
Thomas Prevost
John Pruente
Jimmy Rasco
Jeffrey Ray
Scott Reed
Oleg Roizman
Amitabh Sarkar
Mathieu Sauzay
Alan Sbravati
Mark Scarborough
Alfons Schrammel
Wes Schrom
Pugazhenthi Selvaraj
David Sheehan
Mark Shem-Tov
Richard Simonelli
Heesuck Song
Brian Sparling
Gregory Stem
Craig Stiegemeier
Raman Subramanian
Charles Sweetser
James Thompson
Robert Thompson
Ryan Thompson
Justin Turner
Alwyn VanderWalt
Michel Veillette
Evanne Wang
Trent Williams
Barnes Wilson
Deanna Woods
Kwasi Yeboah
Leo (Kris) Zibert

A motion to approve the Fall 2015 Memphis Agenda was made by Don Platts and seconded by Tom Prevost. There were no objections or additions to the agenda. There was no opposition to approval of the minutes.

Presentation on Advantages and Limitations of Fault Identification Methods of DGA – Duval

Fault identifcation Method	Advantages	Limitations
Key Gas	For cases with only a few ppm of C_2H_2, may provide an early suspicion of arcing fault	Fault identification is wrong or inconclusive in ~50% of DGA cases, when applied with software
Rogers/ Dornenburg Ratios	Historic methods	Do not provide any fault identification in ~30% of DGA cases
Duval Triangle 1	Allows to identify the 6 basic types of faults (corona PD, D1, D2, T1, T2 T3) Always provides an identification of faults, correct in ~95% of DGA cases Allows to easily follow visually the evolution of faults with time	Sometimes difficult to distinguish between low energy faults PD and T1 because it does not use H_2, C_2H_6

Fault identifcation Method	Advantages	Limitations
Duval Triangle 4	Allows to distinguish further between low-energy faults (corona PD, S, O)	Only for those interested to get more information about corona PDs and the 4 sub-types of thermal faults (S, O, C, T3-H)
Duval Triangle 5	Allows to distinguish further between faults T3 in oil only (T3-H) and faults with possible carbonization of paper C	
Duval Pentagon 1	Uses all 5 hydrocarbon gases Allows to identify the 6 basic faults of Triangle 1 + faults S	
Duval Pentagon 2	Allows to identify the 3 electrical faults of Triangle 1 + the 4 thermal faults of Triangles 4 and 5	
Combination of Triangles and Pentagons	Allows to detect multiple faults	Only for those interested to detect multiple faults

A more detailed presentation by Michel is on the schedule for one of the Thursday main Tutorials.

Document Status – Review of Section 7

Claude indicated that several conference calls have been held to work on the text for the revised Guide. As the meeting approached, it was decided to first concentrate on one section at this meeting. Section 7 was sent to the WG for review prior to the meeting. Unfortunately, the Table in this section is the incorrect table and does not match the text. This will be corrected.

A decision regarding which method of presenting the data needs to be made. This decision will drive much of the rest of the work.

The PAR extension expires at the end of next year, which will require the process to be accelerated in order to meet the deadline. The objective is to have a draft out for review before the next meeting.

The introduction to Section 7 is on why DGA is done. The Guide will not direct how to physically deal with a transformer, it will provide information on when it is advisable to do a transformer assessment.

The section also includes a routine/periodic sampling procedure. This is not initiated by any specific action, but rather on a routine basis. The idea is to build a baseline DGA for each unit with a certain number of samples within a short period initially. A specific recommendation regarding the number of samples is not indicated.

Claude stepped through the proposed Figure 2.

Fredi Jakob indicated that the previous tables gave direction on the urgency of the situation based on the levels.

The proposed table for change levels does not treat all of the gases the same as was previously done with regard to the amount of change.

Another change is determining the condition of the transformer. DGA will not tell someone in of itself that a transformer is bad. The use of DGA Status rather than Conditions is proposed. DGA Status and TR Condition are not the same. A transformer assessment is never done on the result of a single sample. Astatistical sample will only indicate that a unit is out of the norm, not necessarily that there is something wrong with it.

Table 1 was presented (corrected version from what was sent out prior to the meeting). Corrected version will be sent out after the meeting. Two sets of values based on the ratio of Oxygen to Nitrogen were provided. Most of the time a lower ratio (<0.15) indicates a sealed system and a higher ratio (>0.15) indicates a breather type unit, but not always. For that reason, this terminology was not used.

A question was asked whether consideration was given to volume of oil and MVA rating. Claude indicated that will be one of the alternatives identified; however, the data that is available is not reliable with regards to this data.

Luiz Cheim indicated how much of the data included the age and what percentage was less than 69kV. After the meeting, it was noted that the values indicated in the meeting may not be correct and will need to be re-reviewed.

Alternate 1 Tables replaces the less than one year with a column for all results.

Alternative 2 keeps the “All” value and provides a range in place of the separate age columns.

Alternative 3 is similar to the original proposed tables with age breakouts, but also with MVA information. However, as previously mentioned, in the database, these two values are the most corrupt values.

A poll will be sent out to the WG with the alternatives presented and the corrected tables in the section 7 document.

There was considerable discussion on the data and assumptions that had to be made regarding the age and years of operation.

The meeting was adjourned at 6:00PM

Claude Beauchemin

WG Vice-Chair

Susan McNelly, WG Secretary

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Unapproved Minutes from the S16 SCIF WG and TF meetings

Annex II – WG PC57.147 Minutes

Guide for Acceptance and Maintenance of Natural Ester Insulating Liquid in Transformers

March 21, 2016 ATLANTA, GA

Chair: Patrick McShane, Vice-Chair: Clair Claiborne, Secretary: Jim Graham

- **Call to Order was made at 3:15 PM**.
- **Introductions/Membership Attendance/Quorum Check**
  - 19 of 30 members present, quorum was achieved
  - 74 guests
  - Total attendance = 93
  - 8 guests requested membership
- A motion to approve the agenda passed.
- A motion to approve the Fall 2015 meeting minutes was passed.
- **Chair's Remarks, Patrick McShane:**
  - PC57.147 Draft 2.0 is currently in ballot. Balloting closes 31 March, 2016. The chair reminding the members to submit their votes before the closing date.
  - As approved at the F15 meeting, a PAR REVISION was submitted to and approved by IEEE SA based on recommended changes to Title, Scope, and Purpose to reflect current recommended nomenclature for insulating liquids and reflect applications in large power transformers.
  - The chair reminded the WG that the PAR expires end of 2016. It is anticipated the guide will be approved by the end of 2016 and an extension will not be necessary.
- **Old Business**
  - None.
- **New Business**
  - Some of the technical comments from the ballot were reviewed but no resolutions were voted on at the WG meeting.
  - A ballot resolution group comprising Deanna Woods, Stephanie Denzer, Susan McNelly, Claude Beauchemin, David Hanson, and the working group officers was formed last fall. Dave Sundin, Larry Christodoulou, Don Doris, and Jeremiah Bradshaw were added to the ballot resolution group.

- James Graham, the standards coordinator, reminded the working group the ballot resolution group shall submit their comment resolutions to the working group for acceptance before recirculating the guide for approval.

- The meeting adjourned by acclimation at 3:30 pm.

Respectively submitted, Jim Graham, Secretary

Post Minutes WG Chair Comment: The WG will meet at the F16 TC Meeting. Also it has been noted that the Initial Ballot Title did not reflect the revised PAR replacing the term "Fluids" with "Insulating Liquid." This will be correct for the recirculation ballot.
Respectively submitted, Patrick McShane, Chair

WG C57.147 Minutes Annex:

Time Line Goals - Key Milestones

• Finalize Key Issues Listing	Done
• TF Final Reports	Done
• WG Officers TF Compilation for Draft 1	Done
• 1st Straw Vote Draft 1.1	Done
• TFs Comment Review Draft 1.1	Done
• Draft 1.2 Straw Vote	Done
• TFs Comment Review Draft 1.2	Done
• Draft 2.0 for WG approval	Done
• Initiate SC Ballot Pool (IEEE SA)	Done
• Ballot (IEEE SA)	Done
• Ballot Resolution	
◦ (BRG formed & complete task)	Q2 2016
• Successful Vote!	Q4 2016
• IEEE SA Approval and Publication	Q1-2 2017

Unapproved Minutes from the S16 SCIF WG and TF meetings

Annex III – TF Insulating Liquids Guides Consolidation Minutes

Task Force on Consolidation of Insulating Liquid Guides

Monday, March 21, 2016

9:30 – 10:45 AM

Capital Central Ballroom

Sheraton Hotel, Atlanta Georgia

The meeting was called to order at 9:35 am by Chair Tom Prevost.

There were 22 of 43 members present. There were 63 guests, and 12 guests requesting membership. A membership quorum was achieved. Guests attending the WG meeting for the first time who request membership or who have not attended 2 meetings in a row (including the present meeting, will be deferred until the next meeting attended.

Agenda

1) Introductions

2) Approval of agenda

3) Approval of November 2015 minutes

4) Review of current document status

   a. C57.147 "Guide for Acceptance and Maintenance of Natural Ester Insulating Fluids in Transformers and Other Electrical Equipment"

      i. In Revision process, PC57.147

      ii. PAR opened 6-Feb-2012

      iii. PAR Expiration 31-Dec-2016

      iv. Ballot Status

5) Are we ready to form WG and submit PAR for Consolidated Insulating Liquid Guide?

   a. Review of task force work

   b. Task force recommendation

   c. Scope and Purpose for PAR (if TF decides to move forward)

6) New Business

Due to the time constraints, attendees did not introduce themselves.

A motion to approve the Fall 2015 Agenda was made by Dave Sundin and seconded by Clair Claiborne. There were no objections to the approval of the Agenda.

Next, a motion was made by Clair Claiborne and seconded by Claude Beauchemin to approve the Fall 2015 Memphis meeting minutes. There were no objections to approval of the minutes.

Chair's Remarks and Discussion:

As a review of current document status:

-Patrick McShane announced that PC57.147 is on track to be approved this year.

- Jimmy Rasco updated the Task Force that ASTM will discuss a path forward at their next

meeting on how to distinguish the difference between new and re-refined oil. Currently the

Scope of D3487 excludes re-refined oil.

Now that remaining guide will be finalized (PC57.147), the question was posed as to whether the Task Force should move forward to develop a Consolidated Insulating Liquid Guide for the five fluids: Mineral Oil, High Molecular Weight Hydrocarbon, Natural Esters, Silicone fluid and Synthetic Esters. A motion was made by Dave Sundin and seconded by Rich Simonelli to develop the guide. It was unanimously approved by the members with no abstentions.

The next step for the Task Force is to develop a scope and purpose for the guide.

No New Business was discussed and the meeting was adjourned at 10:45 am.