Annex B Dielectric Tests Subcommittee

March 28th, 2018
Pittsburgh Pennsylvania

Dielectric Tests Subcommittee		
Chair: Ajith M. Varghese	**Vice-Chair: Thang Hochanh**	**Secretary: Poorvi Patel**
Room : Urban	Date : March 28th 2018	Time: 11:00 am to 12:15 pm
Members: 136	Present at time of checking: 90	Present per attendance roster & recorded to AM System: 88
Guests present: 110	Membership requested: 13	Membership accepted: 10

B.1 Chair's Remarks

The Chair briefly highlighted the requirement that while introducing one need to state their employer/ company and sponsor if the difference from the company. The chair also reminded that IEEE and transformer committees are non-commercial organizations and standards shall focus only on developing performance and functional requirement and not design and construction details.

The Unapproved minutes from the Fall 2017 meeting and the agenda for Spring 2018 meeting was sent out to members and guests before the Spring meeting and it's also posted on the website.

An area that WG and TF have been late with and we need to improve is to send out the Agenda at least 14 days before the meeting. This also applies to on-line WG and TF meetings.

The Chair clarified the Ballot resolution (BRG) process. Only substantial issues brought up in the ballot need to be discussed with the WG as long WG had authorized setting up of BRG. Additionally, unless explicitly empowered by the working group, the BRG comment resolutions shall be presented to the working group for confirmation and approval.

The Chair reminded all attendees to have updated information, such as email address, in the AM system as for all correspondence this system is used. Regarding the AM system.

Per new guidelines from IEEE, Audio/Video recording or photography is not allowed during SC, WG and TF meetings. The secretary could record the meeting for writing the minutes of meetings but this needs to be notified, and recording must be deleted after the use. Chair informed SC that the subcommittee Secretary would be recording the audio of the SC meeting for this reason today.

While moving motion, members were advised to articulate the motion first and clearly state the motion. It's recommended that the motion is made in a written form to have clarity and correct documentation.

The Chair reminded the WG and TF leaders to submit their minutes from the meetings within 30 days to the SC chair and secretary. The SC Secretary then has to submit the SC minutes within 45 days of the SC meeting. To minimize revision and errors in the sub-committee level and transformer committee level minutes, please send the final version of your minutes.

The Chair reminded WGs that call of the patent is required a during every WG meetings including on-line/Teleconference meeting. If there are any patent claim, it shall be noted but not discussed at the working group meetings. Calls for Patents is not required for TF.

There is an increase in Task Forces and Study groups under the Dielectric Test Subcommittee. TF and Study groups are typically created with a specific scope and agenda. It is important that the TF and study group leaders have a clear plan to report back to parent with their recommendation in a reasonable timeframe.

The Chair shared details of upcoming PES sponsored meeting as well as details of next transformer committee. IEEE PES T&D Expo on April 16-19 of 2018 in Denver, CO, USA and the next IEEE PES General meeting – Aug 5-9: Portland, Oregon, USA. The fall committee meeting 2018 will be held in Jacksonville, Florida 14th -18th of October 2018.

The Current Status of PARs was presented by The Chair.

- C57.161 Guide for DFR Measurements is currently under 2nd round of ballot process. The PAR was extended to December 2018.

- WG on C57.127 Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers reviewed the significant comments from the ballot, and a smaller ballot resolution group was established to go over the rest of the comments. The validity of current revision of guide is expiring in 2018.

- A new PAR is approved since last SC Meeting for revision of C57.113 Recommend Practice for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors. WG had the first meeting held this week in Pittsburgh. The standard is expiring in 2020 and the Par in 2021.

- C57.160 and C57.138 are in good shape.

- C57.98 Guide for Transformer Impulse Tests expires 2021. Request for PAR for revision of guide is included agenda for this SC meeting as a new item.

The Chair reminded the WG on attendance requirement for membership and for the continuation and the requirement to have attendance updated in AM system, i.e. to attend two out of last three meetings or three out of five last meetings.

The secretary presented the new members and welcomed them to the subcommittee. 20 had requested membership in the last meeting in Louisville, KY and 12 where accepted. 13 members were changed to guest status. The total membership of the Dielectric Subcommittee is today 136 members.

B.2 Quorum, Approval of Minutes and Agenda

The membership list was presented, and a show of hands of committee members present showed that a quorum of members was in attendance at the start of the meeting. 90 out of 136 members were present, so there was a quorum.

All attendance is recorded in AM System. Per verification of roster 88 members and 110 guests attended the SC in Pittsburgh PA.

Motion to approve the agenda was made by Dan Sauer and seconded by Kent Miller. The chair presented the agenda, and it was unanimously approved.

The Motion to approve the Fall 2017 minutes was made by Marcos Ferreira and seconded by Dan Sauer. The minutes of the Fall 2017 meeting at Louisville meeting was approved unanimously.

B.3 Taskforce and Working Group Reports

Pittsburgh, March 28th 9.30 am, TF on External Dielectric Clearances,
Eric Davis, Chair; Troy Tanaka, Secretary

The Task Force on External Dielectric Clearances met on Monday March 28, 2018 at 9:30 AM in the Omni William Penn Pittsburgh. There were 50 people in attendance; 9 of 18 members, and 41 guests. Several guests requested membership but will not be granted membership because the task force activities are coming to an end. A quorum was not achieved. The full attendance record is available in the AM System.

The chair, led a discussion around a comment made around a previous 2016 Survey that normative notes should be below the table and informative notes can be part of the table. The notes were reviewed during the meeting and all present agree that:

- Note 1 should normative and be the first note below the table.
- Notes 2 and 3 should be renumbered as Notes 1 and 2 respectively.
- Notes a, b and c should remain normative.

Dan Sauer and David Wallace agreed to verify the phase-ground and phase-phase calculations immediately following the meeting.

Since no quorum was achieved at the meeting, the chairmen, sent out a formal request via email on 3/26 requesting approval, disapproval, or abstention prior to April 4th of the following information.

1. Approval of the Louisville Meeting Minutes as written.
2. Approval of the following motion:
   Make Note 1 normative, putting it below the table, and renumber the remaining notes.

Because of formal email, the chair received eleven (11) approval votes, zero (0) no nays, and the chair not voting. Unfortunately, even with several reminder emails, there were a few no responses.

In addition, Fred Elliot asked to be taken off the roles as he is no longer participating in the Transformer Committee Activities. The membership roster will also be adjusted in accordance with the rules of the P&P manual prior to the next meeting in Jacksonville.

B.3.4 TF on Revision of Impulse Tests
Pierre Riffon, Chair; Daniel Sauer, Vice-Chair

The TF met on March 27, 2018, from 4:45 pm to 6:00 pm. Twenty-five (25) members and forty-three (43) guests attended the meeting. Three (3) guests requested membership. The meeting was chaired by Pierre Riffon, Chair of the TF. Mr. Daniel Sauer was the vice-chair.

Attendance has been recorded in the AM system.

Required quorum was met, presence of at least 22 members was required. The TF membership and guest roster has been reviewed after the Louisville meeting and members who did not attend the last three meetings were moved as guests.

The agenda has been approved unanimously. The motion was made by Mr. A. Varghese and was seconded by Mr. A. Bolliger

The Louisville meeting minutes were approved as written by all members present. The motion was made by Mr. D. Wallace and was seconded by Mr. S. Som.

The first item of business was related to the proposal of modifications to clause 10.3.2.1 of C57.12.90 concerning the condition of tertiary and stabilizing windings during lightning impulse tests. This proposal was sent within the TF membership and guests. The proposal gets a 97.4% approval rate and only one negative. The negative was rejected since this was not the essence of the proposal. Several editorial comments were received. A revised proposal will be surveyed once more within the TF. The text related to not perform any impulse test series on stabilizing winding terminals will be moved to an appropriate location within the lightning impulse test section of IEEE C57.12.90. This modification will also be part of the upcoming survey.

The second item of business was related to the proposal of modifications to clause 10.2.4 of C57.12.90 concerning the tap changer position during switching impulse tests. This proposal was sent within the TF membership and guests. The proposal gets a 78.6% approval rate but with 9 negatives. In order to get a better consensus, the Chair presented a revised proposal which may get a larger consensus. The induced switching impulse level on the other winding(s) shall be such that their rated switching impulse levels(s) is (are) obtained. For windings not having a rated switching impulse level, the induced voltage shall be such that 83% of the BIL is obtained on the LV winding(s). This revised proposal will also be surveyed within the TF membership and guests prior to the next meeting.

Under New Business, Sanjib Som asks to add voltage transfer measurement during lightning impulse tests. This subject will be added to the next meeting agenda.

The meeting adjourned at 5:30 pm on March 27, 2018. The adjournment motion was made by Mr. T. Ansari and was seconded by Mr. F. Leal.

The next meeting is planned to be held in Jacksonville, Florida, on October 16, 2018.

Pierre Riffon P. Eng.
TF Chair
March 27, 2018

B.3.5 TF on Revision of Low Frequency Tests

Pittsburgh, PA – March 27, 2018, 1:45 p.m., Chair: Bill Griesacker, Vice Chair: Daniel Blaydon, Secretary: Myron Bell

There were 107 attendees, 41 of 62 members and 66 guests were present at the meeting; 9 guests requested membership, 6 were granted, 9 members were moved to guest status. More than 50 % of the working group members were in attendance at the meeting, therefore a quorum was present.

1. The meeting was called to order at 1:45 PM.
2. Attending members were counted and quorum was verified.
3. There were no objections to unanimous approval of the agenda.
4. There were no objections to unanimous approval of the meeting minutes from the 2017 Fall meeting in Louisville.
5. Old business
    a. Tap changer position during induced test (survey results).
    Bertrand Poulin summarized the results of the 4th survey, indicating a 98.9% approval rate. The majority of the new text will be moved to the annex of C57.12.90 until the Low Frequency Dielectric Test Guide is published, at which point, the material will then be moved to the guide.
    b. Applying pressure inside a transformer tank during induced test (survey results)
    Steve Antosz is still working on this, with Bertrand Poulin conducting the surveys. One last survey will be sent to try and achieve closer to 100% approval.
    c. Alternative Applied test method for HV Delta windings.
    This topic will be moved to the responsibility of the LF Dielectric Test Guide TF, under Dan Sauer.
    d. Clarification of measuring voltage during low frequency dielectric tests
    Bertrand gave a brief description of the 3 different types of voltmeters, and how they display/interpret voltage. Survey results for the topic were reviewed and comments discussed. Bertrand also displayed a proposed addition to paragraph 10.5 of C57.12.90 that would recommend the use of “Crest Responding Voltmeters”, with additional information incorporated into the Low Frequency Dielectric Test Guide. Another survey will be sent out and the results reviewed at the next meeting.
    e. Gassing issue for certain types of transformers with wound cores: proposal for new design test
    Phil Hopkinson provided background information concerning gassing issues for wound core transformers, as a result of poor core ground location. Phil displayed his proposed wording, he would like inserted into C57.12.00 and C57.12.90, requiring a new design test with PD measurement of these types of class I transformers. Input needs to be obtained from those with distribution transformer experience based on feedback from Dan Sauer of Eaton.
6. TF PD Factory Limits report by Vinay Mehrotra

    TF debated the scope and little consensus was achieved. Bertrand Poulin has offered to help come up with a different way to present the topic so we can move on this topic. Changes to the scope must be approved by the main Task Force for Revisions to Low Frequency Dielectric Tests.
7. Study Group – PD in bushings during factory testing – Dave Geibel
    Dave Geibel has agreed to lead the study group on bushing PD during factory testing. A time slot will be requested for the next meeting.

8. New business

A motion was made by Don Ayers to form a task force to revise the test procedure, test levels, and acceptance limits for partial discharge testing of Class I transformers. A 2nd for the motion came from Mickel Saad
The meeting time expired and the motion discussion was tabled until the next meeting in Jacksonville.

The meeting adjourned at 3:00 p.m.

B.3.6 WG - IEEE Guide for the Detection of and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors (C57.127)

Chair: Detlev Gross Chairs Vice Chair: Jack Harley Secretary: David Larochelle

Pittsburgh, March 27th, 2018,
Room: Monongahela

Meeting Attendance
The working group met at 11:00 AM. 55 persons were in the room and 26 members out of 30 were present. Quorum requirement was met. Complete attendance record is available in the AM System.

Discussions
The meeting started with the approval of the agenda (Hemchandra Shertukde, seconded by Gregorio Lobo) with 21 members in favor, 1 opposed. The minutes from Louisville meeting were also approved (motion by Hemchandra Shertukde, seconded by Thang Hochanh) with 18 members in favor, 0 opposed. No new items were raised during the call for patent.
The meeting started with statistics on the ballot group. We had an 81% return rate from the 128 members of the ballot group. 95% of the members approved the guide, with 7 negatives and 10 abstentions.
A request was made from Raja Kuppuswamy to add a section on the evaluation of precision on the result of localization. The motion was made (Gregorio Lobo, seconded by Arturo Nunez). It was rejected with 19 votes.
From all the comments received from ballot, the chair presented all comments that were identified by ballot members as being "Disapproved", "technical" and "Must be satisfied". From all comments reviewed, discussions were made on the following items:
- VHF definition states that Corona produces EMI up to 300 MHz. Raja Kuppuswamy mentioned the possibility for corona to create EMI above 300MHz. The group agreed to change the definition to "…emit *mostly* up to…"

- Coupling capacitor as a sensor for electrical PD: The sentence "There is generally no limitation put on the frequency limitation range" was removed.

- Power Factor Tip up: Raja Kuppuswamy discussed the reasons for power factor to change, before or after the inception of PD. The goal being of simply mentioning the fact that there could be an impact of PD on power factor, no details is needed, and it was accepted to leave the item as it is.

- A comment was received asking to move the historical background of acoustic inspections to an annex. The group decided to leave the information where it is.

- Permanent vs Short-term monitoring: A reviewer asked that the difference be better defined. Alexander Kraetge and Ali Naderian volunteered to provide a paragraph.

- Figure 15 showing suggested initial placement of sensors was considered misleading and not being the optimal initial placement. The description of the figure will be modified to state it is an example of placement.

- Energy criterion: Since not mandatory to understand the acoustic localisation technique, it was preferred to remove the section from the guide. A motion from Alexander Kraetge, seconded by Gregorio Lobo was made and voted unanimously (23 in favor, 0 opposed).

- A comment was received to change “partial discharge” to “electrical discharge” throughout the guide. This comment was withdrawn by its author during the meeting.

A motion was made by Waldemar Ziomek, seconded by Arturo Nunez to approve all modifications discussed by the group that did not get an individual vote. The motion passed with 19 members in favor, 0 opposed.
The chair suggested to form a ballot resolution group that will go through the editorial comments from the ballot and make the necessary corrections. The following individuals volunteered:
- Hemchandra Shertukde
- Jeff Benach
- Ali Naderian
- Marco Tozzi
- James Cross
- Detlev Gross
- Jack Harley
- David Larochelle

A motion to authorize the ballot resolution group to make necessary corrections to the guide and to send back the new revision to the ballot system was made (Hemchandra Shertukde, seconded by Arturo Nunez. It was unanimously approved (0 abstained).
The following participants requested membership and will become members for the next meeting.
James Cross, Anthony Franchitti, Akash Joshi, Baitun Yang
The group will meet again in Jacksonville for the fall 2018 meeting.

Adjournment
The meeting was adjourned at 12:20 AM.
David Larochelle

B 3.7 Working Group for PD in bushings, PTs and CTs – PC57.160
WG Secretary: Thomas Sizemore; WG Chair: Thang Hochanh
Meeting Minutes October 30, 2017 at 4:45 – Louisville, KY

This working group did not meet in Pittsburgh. The guide is currently in Ballot process.

B 3.8 Task Force Winding Insulation Power Factor & Winding Insulation Resistance Limits
Diego Robalino (Chair) and Greg Lobo (Secretary) at the meeting
Tuesday 27/3/2018, Allegheny (17) Room in Omni William Penn Hotel, Pittsburgh, PA.

Today's meeting was held for equipment manufacturers. The general meeting was cancelled; therefore, attendance was not recorded.
Objective is to state correctly on what is needed in the industry to avoid confusion and/or misinterpretation of section 10.10.2 in IEEE C57.12.90 – 2015.
10.10.2 instrumentation +-0.25% insulation power factor for accuracy of measurement is listed in the IEEE C57.12.90 - 2015 and therefore this task force was form due to the fact that the technology in the industry are assumed to be doing better than +-0.25%.

Subcommittee brought up two scopes:

1) The accuracy of instruments in the industry
2) Provide recommended limits PF

The accuracy and reasonable limits were discussed from several representatives of prestigious equipment manufacturers.
Manufacturer 1: 0.5+- 0.02% for PF and less than 0.2% pf of reading for capacitance (absolute values). "This are guaranteed values and not typical values. Typical values are much better."
Manufacturer 2: 0.5+-0.02% for PF and less than 0.5% pf +- 1pF of reading for capacitance (absolute values)
Manufacturer 3: 0.5% for PF and 0.3% pf of reading for capacitance
Manufacturer 4: 0.01% +- 0.005% for PF and 0.01PF for capacitance. (An email will be sent to the chair to validate these values)

John Herron brought up whether to list resolution specification.
Discussion was brought up to whether to dispose published information. Since it is public information than there is no problem unless manufacturer does not want to disclose information.
The statement of accuracy of "measurement" and not "equipment" from section 10.10.2 was discussed briefly to point out what reasonable limits of PF should be. There were suggestions of 1% and 5% of reading were for reasonable limits of accuracy.
Mark Perkins original proposal was 1% of reading.
Peter Werelius suggested 5% of reading +- 0.05% absolute.
Charles Sweetser proposes to rephrase the statement to percentage of reading with absolute values of accuracy. The idea is supported by others.
Preliminary values gathered during this meeting WILL BE REVIEWED by equipment manufacturers and formally presented during our next meeting.
Capacitance limits were also discussed and suggestion was made to have less than <0.5% of reading +- 1pF.
John Herron pointed out that capacitance is not stated in the standard paragraph 10.10.2 in IEEE C57.12.90 - 2015. Therefore, there was a discussion whether to provide the capacitance limits or not.
After several discussions, the proposed revision for Section 10.10.2, C57.12.90 – 2015 "The accuracy of instrumentation should be 5% of the reading ± 5x10E-4 (absolute) of insulation power factor, and the measurement should be made at or near a frequency of 60 Hz"
The meeting was adjourned at 9:17am.

B.3.7 WG C57.113 - Recommended Practice for PD Testing, March 27th, 2018 – 3:15pm
Ali Naderian – Chair, Janusz Szczechowski – Vice Chair
John Foschia – Secretary

- 54 attendees, first meeting so those whom request membership was granted.
  - 17 members requested membership (+ those whom did not note the request as the rosters were not present)

- Introductions carried out

- Asked about essential patent claims – No essential patent claims were noted.

- Motion for approval of agenda
  - Alexander Kraetge 1st, Detlev Gross 2nd
  - Unanimous approval of the agenda as posted

- PAR approved in December 2017, expires 2021. The recommended practice

- Reviewed prior members who worked on this guide and the table of contents

- Detlev Gross
  - The structure of the document is appropriate and adequate, could add additional pattern recognition in the annex portion of the document.
  - No major changes necessary

- Bertrand Poulin
  - Most of the prior work was based on IEC 270
  - A lot of the work was performed by Dr. Lemke
  - Should be synchronized with IEC
  - No major changes necessary

- Ali mentioned that the group's work should be related to dry type guide

- Hem Shertude – is the guide applicable to class 1 and class 2 transformers?
  - Bertrand Poulin – this is for electrical detection of partial discharge, not an explanation of induced potential testing.

- IEC 60270 – 2015 revision – raised upper frequency limit of bandwidth,
  - Detlev Gross– the group should talk about the frequency limits in this IEEE guides.
  - Only 10% of an IEC std/guide can be revised/modified when in "maintenance"

- Detlev Gross - accuracy requirements in IEC are not reasonable, and further discussion about wideband and narrowband was held.

- The following items are relevant for discussion:
  - 1MHz bandwidth, Cross coupling, UHF, calibration of calibrator, SAT

- Calibration of calibrators:

    - Detlev Gross – only 2 companies in Germany and unsure of US that performs calibration of the calibrators.
    - Ali – we could put guidance of this in here. (revise annex C)

- Raja Kuppuswamy
    - Standards have a 10 year life
    - The group should look at the bandwidths and increasing the bandwidth ("take a fresh look")
    - UHF:
        - Many manufacturers do not use UHF
        - Should include guidance on how to use UHF as it is a new trend
        - Ali agrees that it should be an additional accuracy
        - Detlev Gross – uncertainty in UHF is worse than lower frequency. He is strictly opposed to having acceptance criteria for UHF.
        - Bertrand Poulin – UHF used for identifying if there is partial discharge or not. It is not necessarily used for quantification.
        - Raja K. – some OEMs are installing (dielectric windows)? on transformers for future UHF installation.

- Ali – purpose of the group is not to start from scratch (scientific research)
    - CIGRE work in progress

Detlev Gross – cross coupling matrix during calibration is important to measure
Bertrand Poulin – cross coupling should not be in this guide as it is not in the scope of C57.113
Detlev Gross – this information could be in the test guide for LF tests, Ajith agreed.

Bertrand Poulin – UHF does not belong in due to scope; the WT cannot change scope without changing PAR.

Ajith – It is important to provide information to the chair as soon as possible and to provide a presentation of potential revisions to the chair

Alexander Kraetge – this is a recommended practice (not a guide) and we should recommend a best practice, including cross-coupling

Ajith – C57.113 expires in 2020.

Detlev Gross volunteered to provide presentation of IEC related material for the next meeting.

Detlev Gross – IEC 60270 does not have a guide; they are entertaining a CIGRE group to have a horizontal guide.

Alexander Kraetge – CIGRE work has already been performed (100+ pages on transformers)

Ali – UHF is no longer a topic, not in the scope. Will investigate going into the new low frequency test guide

Ali – we could add language or a separate annex regarding SAT

Detlev Gross – do not reword the title of Annex F because the noise identification is important.

Detlev Gross - Dr. Lemke is no longer working (he is ~80 years old)

Original noise identification images are from Lemke

Detlev Gross can provide new images of noise patterns

- Request for task leads:
  - Chapter 4: Detlev Gross
  - Chapter 5: Detlev Gross
  - Annex A: Alexander Kraetge
  - Annex B:
  - Annex C:
  - Annex E:
  - Annex F/SAT: Janusz Szczechooski (Vice Chair)
  - Annex G: Detlev Gross for images
  - Annex H:

  Ali will have 1-2 conference calls prior to the next meeting

- No new business brought up

- Meeting adjourned: Hem Shertudke 1st, Dtlev Gross 2nd.

B 3.8 Task Force Developing Low-Frequency Test Guide
Dan Sauer (Chair) at the meeting
Tuesday 27/3/2018, Pittsburgh, PA.

The Chair called the meeting to order at 9:30 am.

The Chair showed the agenda below:

1. Chair's welcome
2. Introduction of Participants
3. Approval of agenda
4. Review of Task Force Scope
5. Procedure Review
6. The title, Scope, Purpose Discussion
7. Request for Guide Material
8. New Business
9. Adjournment

The Chair asked participants to introduce themselves.
Since this was the first meeting for this TF, quorum was achieved.
Total number of attendees: 76 (not including Chair and Secretary)
Participant requested and granted membership: 51
Corresponding member: 1
Phil Hokinson wanted to add core gassing to the agenda. The Chair explained that core gassing is not part of this TF scope.
Eric Weatherbee made a motion to approve agenda for spring 2018. Greg Lobo seconded the motion. The motion carried unanimously.
The Chair showed the proposed scope from the Fall 2017 Dielectric Test sub-committee minutes:

"Form a TF to develop a PAR for creating a new guide on Low-Frequency Dielectric Testing

Historically we have developed good summaries of tests that are actually guide material
The Chair then mentioned the procedural review as shown below:
This Task Force is charged with creating a title, scope, and purpose for the proposed new guide which is necessary prior to any PAR being approved. Further, once the foregoing is known, it will need to be approved by the Dielectric Test SC and AdCom.
The proposed title text is shown below:
IEEE Guide for Low Frequency Dielectric Testing for Liquid-Immersed Distribution, Power and Regulating Transformers.
Motion was made to approve the proposed title above and seconded by Vinay Mehrotra. During the discussion Phil Hopkinson suggested to remove the liquid immersed wording to include both dry and liquid immersed type transformers.
Ajith Varghese mentioned that this TF is created to accommodate C57.12.90.
Phil Hopkinson made an amendment to the motion to remove 'liquid immersed' from the tile. The amendment motion was seconded by Tauhid Ansari. The motion carried unanimously.
After floor discussions, the new proposed title:
IEEE Guide for Low Frequency Dielectric Testing for Distribution, Power and Regulating Transformers.
The Chair moved on to the scope discussion.
The original proposed scope text is shown below:

This guide provides background information on the tests specified in IEEE Std C57.12.00 and on the test methods specified in IEEE Std C57.12.90 and other standards applicable to liquid-immersed distribution, power and regulating transformers. It is intended to assist in the proper testing of such transformers.
After discussions amongst participants, the scope was changed to the following:
This guide provides additional information on low frequency dielectric tests applicable to distribution, power and regulating transformers.
Phil Hopkinson made a motion to approve the new proposed scope text above. The motion was seconded by Dave Walker. The motion was carried unanimously.
The Chair then displayed the proposed purpose below:
The purpose of this guide is to provide test and procedure background information for the tests specified in IEEE Std C57.12.00 and C57.12.90 and other standards applicable to liquid-immersed distribution, power, and regulating transformers.
A motion was made by Pellev Gross to remove the purpose and was seconded by Brian Penny. The motion did not carry.
Then the Chair changed the purpose text based on feedback from participants as shown below:
The purpose of this guide is to provide background information on conducting and interpreting the results of low frequency dielectric tests.
A motion was made by Phil Hopkinson and seconded by Hem Shertukde to approve the above purpose text. The motion carried unanimously.
The Chair requested that participants send him any information they would like to see in this guide.
There was no new business proposed.
Hem Shertukde made a motion to adjourn the meeting and was seconded by Vinay Mehrotra. The motion carried.

The meeting was adjourned at 10:40am.

Respectfully submitted by Hamid Abdelkamel.

> *Dan Sauer (TF leader) motioned to proceed to a PAR on a new document with title, scope and purpose as defined by the Task Force. Second Vinay Mehrotra Motion was unanimously approved.*

B.4 Liaison Reports

IEEE High-Voltage Testing Techniques Subcommittee
Liaison Report to Dielectric Tests Subcommittee of IEEE Transformers Committee
Submitted by Jeff Britton (HVTT Subcommittee Chair)
March 27th, 2018
Pittsburgh, PA

The High-Voltage Testing Techniques (HVTT) Subcommittee of the IEEE Power System Instrumentation and Measurements Committee met in Jacksonville, Florida on January 10th, 2018, in conjunction with 2018 IEEE PES Joint Technical Committee Meeting. There was a total of:

17 Onsite Attendees – Comprised of 6 Members and 11 Guests
13 Web Meeting Attendees – Comprised of 7 Members and 6 Guests

HVTT Subcommittee Membership was 24 persons at the time of the meeting, including 10 individuals who were announced as new members of the Subcommittee. Quorum was achieved.

Working Group Updates: HVTT presently has 2 active working groups, 1 Active Task Force, 1 New Task Force that will have its first meeting in the Fall of 2018, and 1 Entity Ballot Sponsorship Project active with IEEE SA.

WG P1122 "IEEE Standard for the Digital Recorders for Measurements in High-Voltage and High-Current Impulse Tests" Chaired by Jeff Britton (Phenix Technologies), with Secretary Tom Melle (Highvolt).

This WG met on January 10th, 2018 and continued to review and discuss the performance requirements for digital recorders as stated in IEEE 1122-1998, and to harmonize these technical requirements as much as possible with the present draft for the revision of IEC Standard 61083-1, which remains in the CDV stage.

The majority of the meeting was spent discussing the decision of the IEC Maintenance Team for the revision of IEC 61083-1 during their November 2017 meeting in Toronto, to reduce the overall allowed amplitude uncertainty for impulse digitizers from 2% to 1% as they move from the CDV to the FDIS version of the IEC revision. Such a significant technical change is highly unusual at this stage in the IEC revision process. It is the position of the IEEE WG for 1122 that this change, if adopted, will have unforeseen implications that will necessitate further revisions throughout the IEEE and IEC standards. Limits on the minimum allowed resolution (bit count), as well as a number of other limits on individual contributions to the overall uncertainty will be impacted. Additionally, the uncertainty limits on reference pulse calibrators will need reviewed and probably reduced.

The IEEE WG did agree to lower the minimum resolution requirement to 0.5%, which will effectively mean that 8-bit digitizers will no longer meet the requirements of IEEE 1122. It is expected that that the other uncertainty requirements will not change significantly in the next IEEE revision.

WG P510 "Guide for Electrical Safety in High-Voltage Testing"
Chaired by Jeff Hildreth (Bonneville Power Administration), with Vice-Chair David Wallace (Mississippi State University)

The secretary of this working group was forced to resign due to change of employers, so this WG is presently seeking a new secretary.

This WG met on January 9th, 2018. A detailed table of contents has been developed and accepted by the WG for the new safety guide, and authors have been selected to lead the writing tasks for the various clauses and annexes.

This next working group meeting is scheduled to take place in Portland, Oregon, at the time of the IEEE PES 2018 General Meeting. Initial drafts are due prior to this meeting.

TF to develop a Scope and Purpose statement for a general IEEE PD Guide
Chaired by Nigel McQuin of McQuin Power Consulting

This TF met on January 9th, 2018, and worked on the development of suitable Title, Scope and Purpose Statements. It was agreed that the main body of the guide will focus on PD measurements performed using the using the Wide Band Apparent Charge Method, as defined in IEC 60270.

Specific topics to be addressed, and therefore mentioned in the proposed Purpose Statement include:

- information on basic discharge physics and material related defect discharge mechanisms,
- generic phase resolved partial discharge patterns commonly associated with various defect types,
- discussion regarding the internal propagation of high frequency signals resulting from partial discharges occurring in power engineering equipment, and
- best practices for achieving good measurement results

It is expected that information on other measurement techniques such as acoustic emissions, UHF measurements, and UV light emissions (for example) may be included in informative annexes if authors are willing to contribute.

Pending an email survey of the TF membership for approval of the agreed title, scope and purpose statements, the HVTT Subcommittee will submit a PAR to develop the guide. Detlev Gross of Power Diagnostix has graciously agreed to chair the WG.

TF to develop the Title, Scope and Purpose for an Application Guide for IEEE Standard 4
Chaired by Bill Larzelere (past chair of the HVTT Subcommittee)

There has been interest expressed in developing an application guide to help users of Standard 4 with understanding and implementing some of the new requirements introduced in the 2013 revision, such as:

- Use of the “Test Voltage Factor Method” of “K-factor” method for determining the impulse parameters for lightning impulses having oscillations near the peak
- How to correctly perform uncertainty calculations for high voltage measuring systems in accordance with internationally accepted methods
- How to create and maintain a proper record of performance for a high voltage measuring system

The first task force meeting for the application guide is planned to take place in the fall of 2018.

WG P2426 “Guide for Field Measurement of Fast-Front and Very Fast-Front Overvoltages in Electric Power System” Entity Ballot PAR, Chaired by Dr. Shijun Xie of State Grid Corporation, China

The first WG meeting took place on November 13-14 in Chengdu, China. PSIM Committee Chairman Jim McBride participated in this meeting by conference call.

For the 2018 JTCM, Dr. Xie travelled to the US and presented a WG progress report in the PSIM Main Committee meeting. The Chinese WG presently consists of 22 members, coming from various Chinese utilities, and universities.

The WG has prepared an outline for the guide they are developing in the IEEE Standards Template format, and they have assigned writing tasks to various members.

The next meeting will be held at Qingdao or Xi'an, China, in next April.

The third meeting will be held in Portland, Oregon in August 2018, together with the IEEE PES 2018 General Meeting.

The next round of HVTT Subcommittee meetings are scheduled to take place in October of 2018, tentatively in conjunction with the IEEE Insulated Conductors Committee meeting, in Orlando Florida.

Anyone interested in participating in the work of HVTT should contact Jeff Britton or Jim McBride.

B.5 Discussions

B.6 Old/ Unfinished Business

1. PD Testing Requirement for Class I transformer.

As a follow up of the motion passed during F17 DTSC meeting, This item was added to agenda of TF on the Continuous revision of Low-Frequency Test (RLFT) and initial discussion occurred during S18 RLFT Meeting. DTSC will wait for the recommendation of RLFT.

2. Core gassing and PD Testing on Wound Core Transformer

This issue has been presented in various TF/WG/SC including DTSC during S-15. There was a survey was conducted. Phil Hopkins presented the results of the survey.

- C57.12.00 for 2015 has the dielectric test requirements in table 17 and not in table 18, so changed the reference to table 17.
- C57.12.90 clearly states that section 10.8 is for Class II transformers but wound cores are only in Class I and Distribution Transformers, so I created a new section 10.7.7.
- Core gassing only comes from transformers with Low-High winding construction so added the words.
- One manufacturer has reported proposed 100pC limits are not achievable. Waiting for a recommendation from the manufacturer
- Several people have commented that partial discharge from Dead Front Bushings is a constant concern and limits need to be considerate of it.

During the discussion, many members sought clarity on whether the issue is specific to one manufacturer's design and whether all distribution transformer manufacturers understand the implication of new addition to testing requirements.

As it stands, prior Survey had 87.3% approval. However, there are questions on the 100pC limit, and Phil is waiting for feedback from manufacturers. No motion made during DTSC regarding next steps on this subject.

B.7 New Business

1. **C57.98 Guide for Transformer Impulse Test** is expiring in 2021. Motion to Initiate PAR for revision of guide with scope and purpose in line with existing guide and start a WG was made by Eric Davis and seconded by Dan Sauer.

1.1 Scope

To aid in the interpretation and application of the impulse testing requirements of the IEEE Standard Test Codes for Transformers.

1.2 Purpose

This guide is written primarily for power transformers, but it is also generally applicable to distribution and instrument transformers. Other IEEE standards, plus the purchaser's specifications determine the specific requirements for impulse tests. The purpose of this guide is not to change those standards in any way, but to add background information that will aid in the interpretation and application of those standards. The information contained in this guide is a compendium of technical information provided by engineers and technicians well versed in the art of transformer impulse testing. It is hoped that this guide will provide a basis for a better understanding of impulse test techniques and troubleshooting procedures.

During discussion-Pierre Riffon questioned if a revision is needed. Thang mentioned in the current version of the guide, the K-factor is missing, and there are issues related to K Factor that should be addressed and included.

The motion was passed with no oppose, and ten abstained.

2. Entity PAR Request for DFR guide for Bushings

Sue McNelly gave an update on the request for approval of entity PAR from China for DFR on bushings. Due to overlap with Multiple Transformer subcommittees and concern with limited experience within Transformer committee in handing entity WG, the request will be handled by Transformer administrative SC. Being entity PAR, only corporate who pay the corporate entity fees can be the voting members of WG but having Transformer Adcom sponsor will give transformer committee the final say in work being produced by the WG in approving the document going to the ballot. Transformer Adcom is discussing setting up Taskforce of the Subject expert group to Liaison with the entity WG and transformer committee. At this time no final decision is made.

3. Entity PAR Request for Standard for Lead Exits

Sue McNelly also gave an update on a 2nd entity PAR request for a standard for the Lead exit of 750 KV and 1000 KV transformer. The scope of this PAR is very unclear, and more clarity is needed. No decision was made concerning PAR approval and will be discussed further by transformer Adcom.

4. Instrument transformer standard – Impulse waveform requirement

It was brought up to the subcommittee that there is possibly an error in C57.13 related to waveforms to be superimposed/compared.

11.3.1.7 Detection of failure during impulse test

Any unexplained differences between the first 100% full wave and the final full wave detected by superimposing the two voltage waveform traces, or any such differences observed by comparing the chopped waves to each other and to the full wave up to the time of flashover, are indications of failure. Deviations may be caused by conditions in the test circuit external to the transformer or by protective devices and should be fully investigated.

Due to lack of time, this item was not discussed but will be at the next meeting.

B.8 Adjournment

Meeting adjourned 12.20 PM. Motion to adjourn made by Diego Robalino and Bill Griesacker

Minutes respectfully submitted by:
Poorvi Patel
Secretary DTSC.