1. Dielectric Tests Subcommittee

November 4, 2015

Memphis, TN.

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| **Dielectric Tests Subcommittee** | | |
| **Chair: Michael Franchek** | **Vice-Chair: Thang Hochanh** | **Secretary: Ajith M. Varghese** |
| Room : Grand Ballroom AB | Date : November 4 ,2015 | Time: 11:00 am to 12:15 pm |
| Members : 107 | Present at time of checking : 68 | Present per attendance roster & recorded to AM System: 78 |
| Guests present : 126 | Membership requested : 24 | Membership accepted: 15 |

# Chair’s Remarks

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

The Chair reminded the WG on attendance requirement for new membership and for continuation and the requirement to have attendance updated in AM system. Chair welcomed 1 new member during the meeting.

The Chair shared details of upcoming PES sponsored meeting as well as details of next transformer committee.

Current Status of PARs was presented.

Chair reminded working groups of the new requirement to have a companion document created with new standard as reference for future and also reminded that the editorial responsibility for documents belong to working group.

# Quorum, Approval of Minutes and Agenda

The membership list was shown and a show of hands of committee members present showed that a quorum of members were in attendance at the start of the meeting. 68 out of 107 members were present at time of checking, so there was a quorum.

All attendance is recorded in AM System. Per verification of roster 78 members and 126 guests attended the SC at Memphis.

The minutes of the spring 2015 meeting at San Antonio meeting was approved unanimously. Motion for approval of meeting minutes was made by Daniel Sauer and seconded by Mark Perkins.

Chair presented agenda for the meeting. A motion to approve agenda for the meeting was made by Daniel Sauer and was seconded by Sanjib Som.

# Working Group Reports

## Working Group on External Dielectric Clearances

## Eric Davis, Chair; Troy Tanaka, Secretary

The Working Group on External Dielectric Clearances met on Monday November 2, 2015 at 9:30 AM in the Peabody Hotel Continental Ballroom. There were 39 people in attendance; 11 of 17 members, and 28 guests. One guest requested membership and will be granted membership based on previous attendance. A quorum was achieved. The full attendance record is available in the AM System.

Dan Sauer moved that the meeting agenda be approved. Ajith Varghese seconded the motion.

David Wallace moved that the spring 2015 meeting minutes be approved as written. Dan Sauer seconded the motion. There were no revisions or additions to the minutes. The motion passed unanimously.

Due to a death in the chairman’s family, the chairman was not able to complete updates to the table prior to the meeting. As a result, the working group did not perform any business at this meeting. The chairman will transmit the updated table to the working group via email for review following this meeting. Any necessary communications will occur via email between now and the upcoming Atlanta meeting.

Dan Sauer moved to adjourn the meeting at 9:42 AM. Emil Bercea seconded and the meeting was adjourned.

# B.3.2 WG on Dielectric Frequency Response Analysis (DFR)

**Ali Naderian, WG Chair; Peter Werelius, Vice Chair, Poorvi Patel, Secretary**

**Monday, November 2nd, 2015 – (3:15 -4:30PM)**

The meeting was called to order by the WG chair Ali Naderian at 3:15 PM. This is the fifth Working group meeting. There were a total of 85 attendees; 20 members and 65 guests and 10 requested to become members.

1. With 20 members attending the meeting we had a quorum (out of 30 members)
2. Agenda was approved- motion for approval from Daniel Sauer and Diego Robalino
3. The minutes of meeting from the WG Spring 2015 meeting in Savannah, GA and 2 previous meetings was approved by email prior to the meeting (18 members approved it by email).
4. The first draft DFR guide was uploaded in the IEEE site for review and comments after the spring meeting in Savannah.
5. 160 comments were received by the members and subject matter experts
6. 2 meetings were held to address the comments. Still a couple more meetings would be needed to address all the comments of the document.
7. Target is to complete a second version of the DFR guide by February 2016 and circulate to members and guests of the WG for final comments and review.
8. New Business
   1. The WG Chair was under the impression that the PAR expiration was in Spring of 2016
   2. Tom Prevost checked the PAR and confirmed that the PAR expiration is not until 31 December of 2017
   3. Dan Platts mentioned that the PAR extension does not need a WG approval
   4. Motion for approval of Par for 2 years was made by Daniel Sauer and Mike Franchek- however this was taken back as PAR Extension was found no to be needed until 2017.
9. There were no other New Business to discuss
10. Meeting was adjourned at 3.45 pm
11. Attendance was recorded in AM system after the meeting.

Ali Naderian, WG Chair

Peter Werelius, Vice WG Chair

Poorvi Patel, Secretary

## B.3.3 Working Group for Revision of the Distribution Impulse Test Guide C57.138 Recommended Practice for Routine Impulse Test of Distribution Transformers; Arthur Molden, Chair; Susmitha Tarlapally, Vice-Chair

Working Group for Revision of the Distribution Impulse Test Guide did not have a meeting at Memphis.

WG have submitted draft 2 document to NESCOM for the MEC review. A balloting pool is set and will go to ballot as soon as the MEC review is completed

# B.3.4 Working Group on Revision of Impulse Tests

# Pierre Riffon, Chair; Daniel Sauer, Vice-Chair

The WG met on November 3, 2015, from 4:45 pm to 6:00 pm. Twenty-seven (27) members and thirty-eight (38) guests attended the meeting. Four (4) guests requested membership. The meeting was chaired by Pierre Riffon, chair of the WG. Mr. Daniel Sauer was the co-chair.

Attendance has been recorded in the AM system.

Required quorum was met, presence of at least 23 members was required. The working Group membership has been reviewed after the San Antonio meeting and members who did not attend the last two meetings were moved as guests.

The agenda has been reviewed and a motion to approve the agenda has been made by

Mr. D. Murray and seconded by Mr. A. Varghese. The agenda was approved by all members present.

Minutes of the San Antonio, Texas, meeting were approved, as written, by all members present at the meeting. The motion for approval of San Antonio meeting minutes was made by Mr. T. H. Ansari and seconded by Mr. Y. Shirasaka.

The first item of business was related to a survey on the impulse front time test parameters and tolerances. This survey was sent on October 22, 2014 to the WG membership and to the Dielectric Tests Subcommittee membership. Out of 531 individuals who were asked to participate, only 66 provided a reply (return rate of 12.4%). Out of these 66, 55 were approved or approved with comments (83% approval rate), 3 disapproved and 8 abstained. The negatives were discussed and two were rejected. In order to resolve the third negative, it was agreed upon to add an informative note saying that determination of the impulse wave-shape parameters shall be made on the test voltage curve after having processed the recorded curve by the voltage function. A motion to add the following note was made by Mr. B. Poulin and seconded by Mr. J. McBride. "Note: As required by IEEE Std. 4-2013, the impulse wave-shape parameters such as peak voltage, front time and tail time are determined on the test voltage curve which is obtained after having processed the recorded curve by the voltage function."

The motion has been approved by all the members present. The wording will be circulated to the WG membership and will be voted once more at the next meeting.

As a new item of business, Mr. Ajith Varghese made a proposal regarding a new way of measuring the chopping time during chopped wave tests. The actual wording states that the time that the voltage reaches the zero voltage after chopping shall equal to or less than 1μs. For some winding types such as layer windings, the wave-shape after chopping is over-damped and does not oscillate around the zero voltage level. For such wave-shapes, the time after chopping where the wave-shape crosses the zero voltage level can be much larger than the prescribed 1μs value. In order to solve this problem, he proposed to measure the chopping time from the voltage value at the instant of chopping to a value which is 20% of this voltage. This time shall be equal to or lower than 0.8μs.This will give the same intended maximum dv/dt as the actual requirement. The WG chair will prepare a proposal that will be circulated to the WG membership and guests prior to the next meeting and will be discussed during the next meeting.

As a new business, Mr. Mark Perkins requested to add a new item of business on the WG agenda for the next meeting. His request was related to define a tolerance on the voltage value at the instant of chopping. For some oscillatory wave-shapes having large overshoots, it may happen that the chopping instant coincides when the instantaneous voltage is low (e.g. in the "valley" of the oscillation) thus reducing considerably the stress applied to the transformer windings. The motion of adding this item of business was made by M. Perkins and seconded by R. Verdolin. The motion was approved by all members present. The chair will process some wave-shapes and will try to make a proposal and present some examples for discussion at the next meeting.

The meeting adjourned at 5:45 pm on November 3, 2015. The adjournment motion was made by Mr. A. Molden and was seconded by Mr. R. Verdolin. The motion was approved unanimously.

The next meeting is planned to be held in Atlanta, Georgia, on March 22, 2016.

Pierre Riffon P. Eng.

WG Chair

November 3, 2015 Pierre Riffon P. Eng.

# B.3.5 Working Group on Revision of Low Frequency Tests

## Bertrand Poulin, Chairman; Bill Griesacker, Secretary

## Memphis, TN – November 3, 2015, 1:45 p.m.

# There were 117 attendees, 25 members and 92 guests present at the meeting; 8 guests requested membership. More than 50 % of the working group members were in attendance at the meeting, therefore a quorum was present.

# The agenda for the meeting was presented and unanimously approved.

# A motion was made to approve the minutes from the spring 2015 meeting in San Antonio, TX. The minutes were unanimously approved with no objections or comments voiced.

1. Old business
   1. Applying pressure inside a transformer tank during induced test.

Survey Results: 203 ballots sent out; 134 returned 87 approve, 26 approve with comments, 10 disapprove for an approval rate of 91.9 %.

The Chairman will review the comments with the help of members of the WG who have volunteered for this task. The comments and negative votes can be summarized by the two following questions:

1. Should the working group establish limits of pressure application during the PD test?
2. Is it acceptable to use a “test” conservator that is installed in the test hall, possibly applying higher than service pressure?
   1. Tap Changer Position During Induced Test

Survey Results: Of 204 ballots sent out 134 returns, 91 approve, 27 approve with comments, 4 disapprove, resulting in an approval rate of 96.7 %. The comments and negative votes related to this survey were not discussed during this meeting.

Wound core gassing issue on distribution and class 1 transformers: proposed design test.

Survey results: 202 sent out, 132 returns, 82 approve, 14 approve with comments, and 14

disapprove for an approval rate of 87.3 %.

Comments will be reviewed by the Authors of the proposal. If needed, a task force will be formed for this task. Decision to be made at the SC meeting.

1. New Business
   1. Applied test for transformers with high voltage delta windings.

Proposal is for an alternate test method of the applied voltage test, a test applied to each phase, which would allow use of lower voltage source so that a PD free source is easier to achieve. The frequency of test would generally be the same as the induced voltage test since applying voltage on LV windings and inducing two legs of core. The same voltage as required for the Applied Voltage Test in C57.12.00 would be achieved on the HV delta winding during this test. Motion made by Mark Perkins to vote to send out a working group survey on the new alternate method as a replacement test for the applied voltage test. A vote was taken and accepted unanimously to conduct the survey.

Another aspect mentioned during the meeting was the monitoring of pd during the applied test or the new proposed alternate test on HV delta connected transformer windings. This issue will be discussed at the next meeting.

Joe Foldi proposed to have an alternate test circuit by exciting three phases on the LV wye winding and ground one corner of the delta winding.

* 1. Dielectric tests in the field. Mark Perkins will write the details of a motion to generally require field tests on transformers with new insulation to be tested in accordance with C57.12.00 test voltage levels and transformers with other than new insulation to be tested in accordance with C57.12.90 test voltage levels. Background levels for PD can be a problem in the field and will need to be addressed.

# This working Group plans to meet next in March of 2016 at the Spring Transformer Committee meeting to be held in Atlanta, GA.

## 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**

**Memphis, Nov 2nd 2015**

**Room: Grand Ballroom D**

The working group met at 11:15 AM. 34 persons were in the room and 19 members were present.

Quorum requirement was met. Complete attendance record is available in the AM System.

The following guests were granted membership:

‐ Omar Ahmed

‐ Jeffrey Benach

‐ Gustavo Leal

‐ Gregorio Lobo

**Discussions**

The meeting started with the approval of the agenda (motion by Hemchandra Shertukde, seconded by

Michael Franchek). The minutes from San Antonio meeting were the approved (motion by Jeffrey

Benach, seconded by Omar Ahmed).

Charles Sweetser and Arturo Nunez presented their work correlating certain sources of acoustic emissions to a frequency range. It was told that two types of sensors can be used, the first and most common being a resonant sensor that will have a higher gain around is central frequency. The second type of sensor is called “bandwidth” sensor. It shows a much more flat response over the frequency range but has around 3‐4 dB less sensitivity. The bandwidth sensor is well suited if FFT analysis is to be performed. It was noted that FFT can still be performed when using resonant sensors keeping in mind that its frequency response will affect the signal.

Questions were raised regarding the impact of hotspots and humidity on the acoustic frequency content. It was explained that both issues would behave like PD in bubbles. Humidity will take longer to initiate PD but will have similar features.

A question regarding the elements that trigger an acoustic inspection was raised to identify circumstances where acoustic monitoring recommended in preventive maintenance perspective. It was told acoustic inspections were almost always triggered by another well‐established monitoring technique (DGA for online transformers, PD acceptance test for manufacturers). Arturo Nunez mentioned that acoustic monitoring can sometimes be used periodically to trend a known problem in a transformer, trying to characterize its evolution in time. If there are no technical limitations that would prevent users to use acoustic monitoring in a permanent installation, it is not a common practice as a lot of environmental interferences (electrical or mechanical) can affect the system. The necessity of section 5.5 (On‐line (continuous) acoustic monitoring system) was questioned. Jack Harley then explained that concerns about static electrification in transformers were an issue at the time were the previous revisions of the guide were made and led to the addition of chapter 5.5. Some key transformers in power generation were equipped with epoxy rods crossing the tank and connected to acoustic sensors in a permanent way. Ali Naderian mentioned another example where permanent acoustic monitoring can be desired for nuclear plant transformers were as much data as possible. This technique being nonintrusive (external sensors) is seen as an advantage.

Robert Bruschetta noted that section 5.1 needed rephrasing not to exclude any possible application of acoustic testing. Gustavo Leal asked how acoustic monitoring compares to other techniques. It was told that DGA and electrical monitoring (from bushing for example) are preferred over acoustic monitoring. An acoustic system could be used as a complement to these the preferred method, but is not recommended as the only monitoring system on a transformer. Marco Tozzi suggested that section 5.5 be modified to highlight the fact that permanent acoustic monitoring is not considered as the preferred (or only) transformer monitoring technique.

The group will meet again in Atlanta for the spring meeting.

**Adjournment**

The meeting was adjourned at 12:15 PM by motion from Gregorio Lobo seconded by Arturo Nunez.

David Larochelle

## B 3.7 Working Group for PD in bushings, PTs and CTs – PC57.160

## WG Secretary: Thomas Sizemore; WG Chair: Thang Hochanh

## November 3, 2015 at 4:45 – Memphis, TN

The meeting of this working group was led by Thang Hochanh.

Roster sheets were circulated for attendees and guests to sign in. Interested individuals could also indicate an interest in joining the working group on these forms. A check for a quorum was made at the beginning of the meeting and the quorum requirements were not met with 11 members in attendance.

The minutes from the San Antonio meeting and the agenda for this meeting were presented, but due to the lack of quorum they were not submitted to the WG for acceptation.

Thang Hochanh made a request for additional partial discharge test patterns. Andre Rottenbacher and David Wallace indicated they could provide additional patterns for the instrument transformers.

As a means of guiding the discussion a series of comments by Pierre Riffon and the most recent draft (5.3) were reviewed together. Most items were relatively small items but the four specific items listed below were the main discussion points.

**Item 1:** Clause 4.2.2 Test circuit:

The ambient noise of ½ the maximum partial discharge limit should only be “a desirable goal”.  Nevertheless, the noise can be as high as the partial discharge limit if during the test nothing over the noise level is observed.

Discussion of this point was initiated between Thang Hochanh and Pierre Riffon. An item contributed by Detlev Gross was that the nature of the signal must be considered if the background noise is not low. The main point of the discussion is that a test can be accepted when the stationary noise generated by the source / environment can be clearly identified from the partial discharge coming from the test object. New text for this section is to be proposed based on this conversation.

**Item 2:** Clause 6.5.1 Calibration

The calibration shall be performed within 50% and 200% of the PD limit.  Replace “…at 50% and 200%...“ by “…within 50% and 200%...“

Pierre discussed what he meant in this comment. Both Dave Gibel and Thang Hochanh had several comments to ensure that intent of this comment was clear. Pierre Riffon emphasized that a calibration at the PD limit is the preferred level but acknowledged that in some situations this is not practical.

In résumé, the discussion cover the case were the calibrator used for the test does not have the exact pico-coulomb limit prescribed by the test requirement.

As an example, when the partial discharge limit is 25 pC and the available calibrator does not have this exact value, the test person can choose the value below or above the required partial discharge limit.

* 50% of 25 pC is 12.5 pC
* 200% of 25 pC is 50 pC

Usually commercial PD calibrators, have step values of 20 pC and 50 pC, in the above range.

The test person can choose 20 pC or 50 pC as the initial calibrated value.

**Item 3:** Clause 7.2.3 Perform a calibration of the test circuit

This is similar to the discussion of Clause 4.2.2 and will be handled similarly in this section.

The ambient noise of ½ the maximum partial discharge limit should only be “a desirable goal”.  Nevertheless, the noise can be as high as the partial discharge limit if during the test nothing over the noise level is observed.

**Item 4:** Clause 7.3.1 (CT)

Often, the pre-stress level is equal to the power frequency withstand test (see IEEE C57.13.5).  When performed at 50 Hz or 60 Hz the pre-stress voltage duration is maintained for a duration a 60 seconds not 7200 cycles.

The conversation on this point focused on the difference in the required frequency for CTs and PTs.

It is necessary to take in account in this clause the frequency of the test source in order to comply with the 7200 cycles and the frequency of the source. This subject is related to applied voltage to potential instrument transformers. When the frequency of power source is higher than 2 time the power frequency (i.e. 60 Hz), then the duration will be less than 60 seconds. The minimum duration is still no less than 15 seconds. The 60 seconds is the maximum duration for all cases.

Example:

Power source frequency is 180 Hz. Applied duration will be 40 seconds.

Shibao Zhang made a proposition to remove 2 paragraphs of clause 6.2, concerning the inboard end of the bushing in oil. It was accepted by the chairman.

The meeting was dismissed as the discussion on comments from Pierre Riffon was completed.

This WG plans to continue working at the Atlanta meeting.

Secretary: Thomas Sizemore

Chairman: Thang HOCHANH

**B 3.8** **Task Force Winding Insulation Power Factor & Winding Insulation Resistance Limits**

## WG Secretary: Diego Robalino; WG Chair: Susmitha Tarlapally

**November 3, 2015 at 8:00 – Memphis, TN**

Meeting started on November 3, 2015 at 08:00 am at the Peabody Memphis Hotel, Grand Ballroom D. Agenda presented to all attendees

Attendance:

Total: 94 attendees

Members: 2

Requested membership: 43

Guests: 49

1. Attendees Introductions

TF Chair – Susmitha Tarlapally (Electrical engineering manager, ABB Inc, Jefferson City, MO

Secretary – Diego Robalino (Senior Applications Engineer, Megger North America, Dallas, TX)

1. TF Chair made a presentation of the proposed scope for the TF and invited all attendees to become members of the TF.

Proposed Scope:-

Review and determine if limits for, winding insulation power factor and insulation resistance for power and distribution class transformers that include both mineral oil and alternate liquids, can be established.

1. The presentation included references form IEEE Standards C57.12.00.2010, C57.12.90.2010 and C57.152.2013, where limits have not been set for PF or for Insulation resistance. It was also pointed out that NETA has provided reference values noting that specific limits are not given in the regulating standards.
2. The text from C57.12.90.2010- Table 4 Notes on Power Factor were discussed where interpretation of results is based on experience and a variety of other factors.
3. The question put to the attendees was: What would be a typical Power Factor value to consider before the transformer is shipped?. What is a typical number that necessitates the manufacturer to investigate further before shipment?
4. Similar discussion was taken regarding the information provided in the standards for interpretation of IR.
5. Presented the reference tables from NETA stating that “in absence of consensus standards, he NETA Council suggests representative values.
6. Not having consensus in the reference standards implies as well a variety of values given by manufacturers that will differ from factory to factory.
7. Therefore, the importance of this TF is to collect data and provide a logical, understandable and beneficial statistical analysis.

**TF Chair requested the input form the attendees and initiated an open discussion**

Mark Perkins (ABB) – stated that PF is misunderstood for limits. ABB has lots of experience with DFR and has gained more understanding now of PF. Modeling of different types of transformers considering the parameters affecting PF are: % of cellulose material vs liquid insulation and temperature correction. Large power transformers are about 20% - 30% paper and the oil volume may lower the PF value. Other parameter is moisture concentrated in cellulose. Conductivity of oil, for power transformer IR is a task of oil conductivity as direct measurement. The suggestion is to probably come up with a three-dimensional model having PF, temperature and moisture will clarify the topic. It also need to consider type of winding and core. Mark also proposed to include theoretical references of PF vs other parameters. Mark volunteers to take this task.

Poorvi Patel (ABB) – questioned if this TF is only for factory acceptance values or also field?

Susmitha Tarlapally (ABB) – indicated that initially the TF will look into acceptance/factory values, but the TF would want to stablish guidelines for service aged distribution transformers.

Evan Langran (RES) – suggested to include service life meaning chronological years in service (real service not just reference to manufacturing date), vector diagram and service application.

Ajith Varghese (SPX) – suggested also Tap changer type, bushing type, type of insulation oil for IR and PF, reprocessed oil vs new oil.

Donald Agers – suggested material used for the insulation winding

Peter Heinzing (Weidman) – look for materials, laminated wood, influence on PF, geometry of windings.

Paintong Yang (pens. Xmer), - coil configuration

Ali Naderian – separate the field and the factory data. Suggested to include oil tan delta

Chuck Switseer (OMICRON) – commented about the complications faced in C57.104. Data was collected and it is proprietary. Reminded of the issues with temperature collection, PF and IR differences between CHL vs CH and CL. He also suggested to consider the slope of power factor sweep.

Poorvi Patel – questioned is the collect data from the field should only consider units in good condition.

Robert Lobo (Mitsubishi) – Suggested to include atmospheric conditions. %HR and pressure may have an influence

Egon Kirchenmayer (Siemens) – PF for core and windings,

The input from the attendees has been gathered. At this point the effort of the group is to collect the data and start working on the statistical analysis.

Diego Robalino (MEGGER) indicated that there will be information that manufacturers may not be able to share and for now we should be able to identify those particular parameters. The invitation was extended to all attendees to volunteer and contribute with the work of this TF.

**Volunteered:**

Kirk Robbins (Exelon)

Evan Langran (RES)

Ajith Varghese (SPX)

Poorvi Patel (ABB)

Egon Kirchenmayer (SIEMENS)

Pugazhenthi Selvarajay (Virginia Transformers)

Jermaine Clonts (Power Partners)

Krishnamurthy Vijayan (CG Power Systems)

Vijay Tendulkar (SMITHS Power)

Gregorio Lobo (Mitsubishi)

K. Shane Smith (Delta Star)

Mike Perkins (ABB)

Michael Franchek (WEIDMANN) – dielectric Test SC Chair noted to the TF that IEEE has the ability to manage confidential data under an established DB system. There will be confidentiality agreements to protect the information and make sure it is secure for all participants during the process.

Wallach (Duke Energy) has records of PF in the database.

Peter Werelius – recommends an organized way to collect data, from DFR we know better the behavior of PF as it is related to other factors. The statistical analysis should be such that a bad batch of data should not leverage the good data and mislead the interpretation and the limits for IR or PF. Volunteer as well.

Information was collected and the meeting adjourned at 9:05

# Liaison Reports

## Voltage Test Techniques (HVTT), IEEE Standard 4 - Arthur Molden

HVTT group did not meet at Memphis.

# Discussions

* As a follow up of WG report of low frequency test, it was discussed and agreed in SC, that survey comments on wound core gassing will be reviewed by Phil Hopkinson and team that originally proposed the test and new text will be re-surveyed. Susmitha Tarlapally requested that it should be surveyed in both DTSC and WG, which was agreed.
* With respect to alternate applied voltage test method that approved to survey in WG of low frequency test, Mr. K Vijayan ( PTI ) commented that WG approval for survey is unrelated to PD measurement during Applied voltage test. Vijay wanted to be clear that PD measurement during applied voltage test was not discussed in WG and it should not be linked to the survey prosing alternate test method. Bertrand Paulin clarified that that PD measurement is a separate new items for future discussion.

# Old Business

No old Business was there for discussion

# New Business

* Scope definition of DTSC was brought as new items for discussion by the chair. Chair read the current text from transformer committee manual which many members felt did not adequately reflect the work undertaken by this subcommittee. There was lot of discussion around word “ voltage test “ included in current text with some members  suggesting  alternative wordings  of  “ Dielectric Test” , “ over voltage test” or “ Assessment test ”. It was also pointed out that reactors are in scope but is missing in current scope statement.

A question was asked if Dry transformers are in scope of DTSC, which Chair answered in negative.

With many suggestions and no consensus on the wording of scope, a motion was brought by Daniel Sauer to have chair frame the text/wording incorporating comments made during discussion and have the wording surveyed within members of DTSC. This motion was seconded by Bertrand Paulin and was approved unanimously.

A separate motion was passed to establish a "Standard 4 Technical Advisory Group" as part of Transformers Committee Meetings, as is done by our IEC TC 14 Technical Advisory Group. This would provide a forum for our members to discussion and comment on the work being done by the HVTT Working Group .Motion brought by Art Molden and seconded by Jim McBride was approved unanimously.

# Adjournment

Meeting adjourned 12.15 PM.

Minutes respectfully submitted by:

**Ajith M. Varghese**

Secretary DTSC.