

Annex B Dielectric Tests Subcommittee

March 23, 2016

Atlanta, GA.

Dielectric Tests Subcommittee		
Chair: Michael Franchek	Vice-Chair: Thang Hochanh	Secretary: Ajith M. Varghese
Room : Capitol Ball Room	Date : March 23, 2016	Time: 11:00 am to 12:15 pm
Members : 116	Present at time of checking : 77	Present per attendance roster & recorded to AM System: 83
Guests present : 142	Membership requested : 19	Membership accepted: 11

B.1 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 15 new member during the meeting. It was also noted that SC roster currently have close to 500 guests and guest list will be reviewed before next meeting and will remove guests from roster who have not been attending the meetings.

The Chair shared details of upcoming PES sponsored meeting as well as details of next transformer committee. PES T&D Expo will be at Dallas from 2016 May 2nd to 5th and next transformer committee will be from October 23-27, 2016 at Vancouver, Canada.

Current Status of PARs was presented.

Chair announced that he will be stepping down from Chairmanship after Atlanta meeting and current secretary, Ajith Varghese has volunteered to take over the chairmanship. Thang Hochanh will remain the vice chair and new secretary will be announced later.

B.2 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. 77 out of 116 members were present at time of checking, so there was a quorum.

All attendance is recorded in AM System. Per verification of roster 83 members and 142 guests attended the SC at Atlanta.

The minutes of the Fall 2015 meeting at Memphis meeting was approved unanimously. Motion for approval of meeting minutes was made by Kenneth Skinger and seconded by Daniel Sauer.

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

B.3 Working Group Reports

B.3.1 Working Group on External Dielectric Clearances

Eric Davis, Chair; Troy Tanaka, Secretary

The Working Group on External Dielectric Clearances met on Monday March 21, 2016 at 9:30 AM in the Sheraton Atlanta. There were 64 people in attendance; 15 of 18 members, and 49 guests. One guest requested membership, but will not be granted membership based on requirements stated in the Policies and Procedures Manual for Working Groups. A quorum was achieved. The full attendance record is available in the AM System.

David Wallace moved that the meeting agenda be approved. Dan Sauer seconded the motion. The agenda was unanimously approved.

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.

The discussion began with the description stated in the 6th column of the Table 10. The group agreed to clarify the column by renaming it to state “Minimum Clearance between live parts of different phases of the same voltage”.

A majority of the discussion focused on the informative notes in Table 10 and the normative notes beneath it. With regards to informative notes, the WG modified Note 1 to state, “The external clearances given are for transformers intended for operation at altitudes of 1000 m (3300 ft) or less. For operation in excess of 1000 m, please refer to Paragraph 4.3.2.” Note 2 was modified to state, “The above clearances are the minimum required to ensure satisfactory operation considering only the effects of electrical stress.”

In addition, Peter Balma moved to relocate the normative note “Transformers at nominal system voltage of 735kV, 765kV, and 110kV are normally single phase so that clearances between live parts of different phases is not an issue” to become informative Note 3. Dan Sauer seconded the motion and the WG unanimously agreed.

With regards to Normative notes, the WG modified normative “note a” to start as “Note that...” rather than “It should be noted that...” After some discussion, the WG agreed to keep normative notes “b” and “c” as normative notes.

The WG made some editorial comments to the text including modifying the description of Article 1.1 and Table 10 to read “Minimum external clearances of transformer live parts” in order to be consistent with the data in Table 10.

After completing discussions about modifications to the text and table, Dave Wallace made a motion to send the revised text and table to the Dielectric Test Subcommittee for approval. Dan Sauer seconded the motion. The WG voted to send the revised text and table to Subcommittee by a vote of twelve (12) to one (1). The chair agreed to make the appropriate changes before sending the document to the subcommittee.

The chair thanked the WG for their efforts and asked for a motion to adjourn. Dan Sauer moved to adjourn the meeting. David Wallace 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, March 21st, 2016 – (3:15 -4:30PM)**

The meeting was called to order by the WG Vice chair Peter Werelius at 3:15 PM. This is the sixth Working group meeting. There were a total of 71 attendees; 19 members and 51 guests and 8 requested to become members. 6 memberships were granted.

1. With 19 members attending the meeting we had a quorum (out of 32 members)
2. Agenda was approved- motion for approval from Subramanian Raman and Diego Robalino
3. The minutes of meeting from the WG Fall 2015 meeting in Memphis, TN, was approved- motion for approval from Daniel Sauer and Michael Franchek.
4. To complete a second version of the draft DFR guide 3 conference calls and one face to face meeting was held to go through all the 160 comments that were received after the first circulation.
5. The PAR is expiring on 31st of December 2017. To reach this deadline the following timeline is targeted.
 - a) Draft second revision of the DFR guide to be circulated to members and guests for review by April 7th.
 - b) Members and Guests to submit their review by the 12th of May- (6 weeks)
 - c) TF chairs to resolve new comments by 30th of June.
 - d) Ready for voting to submit to ballot by Vancouver in Fall 2016
6. Review of the chapter in the DFR guide by the task force leaders
 - a) Diego presented the chapter 4- DFR Measurements Overview
 - b) Chuck presented chapter 5 and 6. Reviewed the changes in tables 3-6 and test record section 6. Comment by Mark to add what to do if you have a core ground shield between the winding. This should be added in the next revision. We may also want to include the influence of windings not measured but in placed in between to other windings under test
 - c) Peter presented chapter 7- showed cases where higher voltage would be beneficial and also cases that should the influence of stop frequency. Summary and stated in the MEMO is
 - o DFR test voltage is typical 140 RMS. Higher voltage may be used.
 - o Stop Frequency range 0.01 Hz to 0.0001 Hz

- d) George presented Annex A
 - e) Poorvi presented non-moisture related cases that are presented in Annex B
 - f) Mario had a presentation on measuring challenges
7. Comments were made if
- a) DFR from winding to core ground (UST) may be included - this way the influence of bushings will be taken off
 - b) DFR in a non-oil filled unit should be mentioned. Doing the DFR on a dry unit (not oil filled) may give better estimation of the moisture.
8. Meeting was adjourned 4.15 pm- motion to adjourn by David Sauer and Mario Locarno.
9. Attendance was recorded in AM system after the meeting.

Ali Naderian, WG Chair- Not present at this meeting
Peter Werelius, Vice WG Chair
Poorvi Patel, Secretary

**B.3.2 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**

Atlanta GA, March 23rd, 2016

Our working group did not meet this time. We have balloted the Draft 3 document and the ballot closed on March 11th.

There were 95 balloters signed up, of which 78 responded; a 95% response rate.

Of those responses there were 68 affirmatives, 3 negatives and 7 abstentions; a 95% approval rate.

We received 75 comments in all and we are currently working on resolution of those comments.

Art Molden WG Chair.

3/23/2016

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

The WG met on March 22, 2016, from 4:45 pm to 6:00 pm. Twenty-two (22) members and fifty (51) guests attended the meeting. Five (5) guests requested membership. The meeting was chaired by Pierre Riffon, chair of the WG. Mr. Daniel Sauer was the vice-chair.

Attendance has been recorded in the AM system.

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

The WG chair will also clean the guest roster since several of them do not attend anymore WG meetings.

Since the quorum was not met, approval of the Memphis meeting minutes will be postponed to the upcoming meeting in Vancouver, BC, Canada.

The first item of business was related to a survey on the impulse front time test parameters and tolerances. This survey was sent on December, 29, 2015 to the WG membership. Out of 287 individuals who were asked to participate, 70 provided a reply (return rate of 24.4%). Out of these 70, 66 were approved or approved with comments (94.3% approval rate), 3 disapproved and 1 abstained. The negatives were discussed and one was rejected. The two other negatives were excellent comments and were accepted. The reference to the test voltage function described in IEEE Std. 4 will be moved in the main text under clause 10.3.1 "General". A fourth survey with the modified proposal will be sent to the WG and Dielectric test Subcommittee prior to next meeting.

The second item of business was related to a survey on the way that the chopping time during chopped-wave tests is defined and measured. This survey was sent on December, 29, 2015 to the WG membership. Out of 287 individuals who were asked to participate, 63 provided a reply (return rate of 22%). Out of these 63, 58 were approved or approved with comments (92.1% approval rate), 2 disapproved and 3 abstained. The negatives were discussed and were rejected. A second survey with the same wording as surveyed will be sent to the WG and Dielectric Tests Subcommittee membership prior to next meeting.

The third item of business was related to a survey on the instantaneous voltage level at instant of chopping. This survey was sent on December, 29, 2015 to the WG membership. Out of 287 individuals who were asked to participate, 50 provided a reply (return rate of 17.4%). Out of these 50, 37 were approved or approved with comments (74.0% approval rate), 8 disapproved and 5 abstained. The negatives together with the initial proposal and a new modified proposal were discussed. No decisions were taken because of the lack of quorum. The Chair will prepared a modified proposal that will be sent to the WG membership prior to the next meeting.

The meeting adjourned at 6:00 pm on March 22, 2016.

The next meeting is planned to be held in Vancouver, BC, Canada, on October 25, 2016.

Pierre Riffon P. Eng.
WG Chair
March 22, 2016

B.3.5 Working Group on Revision of Low Frequency Tests
Bertrand Poulin, Chairman; Bill Griesacker, Secretary

Atlanta, GA – March 22, 2016, 1:45 p.m.

1. There were 110 attendees, 25 members and 85 guests present at the meeting; 21 guests requested membership. More than 50 % of the working group members were in attendance at the meeting, therefore a quorum was present.
2. The agenda for the meeting was presented and unanimously approved.
3. A motion was made to approve the minutes from the Fall 2016 meeting in Memphis, TN. The minutes were unanimously approved with no objections or comments voiced.
4. Bertrand Poulan resigned as Chairman of the working group and Bill Griesacker accepted the position of Chairman. Bertrand intends to follow through with the old business items that he started to provide continuity in bringing resolution to these items. The attendees of the working group were offered to volunteer for the positions of Vice-Chair and Secretary; the intent is to have these positions filled by the next meeting.

5. Old business

- a. Applying pressure inside a transformer tank during induced test.

Bertrand Poulan reviewed modified text that he prepared as suggested wording to address this issue. A limit of 0.5 psi (3.5 kPa) was offered as a limit based on previous comments requesting a specific limit. It was questioned if it would be better to not allow any artificial adjustment to the pressure, i.e. test at a normal tank pressure. However, based on prior negatives asking for a specific pressure limit, one has now been added.

The recent modifications to the offered text will be surveyed.

- b. Tap Changer Position During Induced Test

Bertrand Poulan modified the draft proposal based on the feedback from the survey comments. The new text has several examples for guides. It was debated if the examples should be placed in an annex or left in the text. The examples will be left in the main text based on comments from several European reviewers that were not as familiar with the North American tap changer practice.

The new modified text will be surveyed.

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

Phil Hopkinson was not present at the meeting to give a status or present material on this topic.

6. New Business

- a. Applied test for transformers with high voltage delta windings.

The topic was discussed, including the proposed test circuit. A motion was made to strike the comments referencing the benefit the test lends to partial discharge measurement during the applied voltage test. Note that there was no recommendation or requirement in the text to measure PD. The working group voted to reject this motion. A second motion was made to move the comment on PD during applied voltage test to a note. The working group voted to accept this motion.

- b. Dielectric tests in the field. No activity. 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.

- c. Induced Voltage Test - Partial Discharge Level is too high.

A request was made by Edgar Trummer to review the partial discharge acceptance level since some of his customers view the IEC 300 pC limit and the IEEE 500 pC limit as unacceptably too high. They strongly suspect that transformers with several hundred pC measured during factory test, but within the standard limit, are more susceptible to premature failures in service.

7. This working Group plans to meet next in October of 2016 at the Fall Transformer Committee meeting to be held in Vancouver, BC.
8. 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

Atlanta, March 21st 2016

Room: Georgia 2,3

Meeting Attendance

The working group met at 11:00 AM. 34 persons were in the room and 14 members were present. Quorum requirement was met. Complete attendance record is available in the AM System.

Discussions

The meeting started with a presentation by Arturo Nunez on the all acoustic system. He mentioned two distinctive methods of covering a power transformer for acoustics. The first method involves a 1 channel detector that is used to periodically map the acoustic activity on the transformer. This method can be used for general surveillance.

The second method uses 12, 24 or more acoustic sensors in order to localize the partial discharge source when having stronger indications of partial discharge. Arturo then presented field test results. Some cases allowed to repair the transformer on site and avoided an unplanned outage. Another case used monitoring over a long period and shown a sharp rise of acoustic activity that lead to a planned outage for inspection that revealed an issue that had to be repaired.

We then proceeded with the assistance count and quorum was obtained. We could approve the current agenda (motion by Michael Franchek, seconded by Aaron Sexton) and the minutes from Memphis (motion by Hemchandra Shertukde seconded by Michael Franchek).

Alexander Golubev made a presentation on acoustic and electrical signal characteristics in the localization process. In the list was the fact that pulse count is not available using acoustic sensors because the ringing of the signal might hide repetition of PD events.

The main topic of the presentation was on the use of coupling capacitor and the effective bandwidth available for the measuring device. A simple R-C circuit cannot be used to calculate the bandwidth provided by the sensors. Parasitic effects will affect the impedance at different frequencies and will make the real bandwidth difficult to predict. The choice of the bandwidth is a compromise between the noise (decreases at higher frequencies) and the coverage of the sensor (low frequencies will be less attenuated over the distance).

After the presentations, we discussed the chapter 5 of the current revision. A comment was made regarding a statement saying that the all-acoustic system does not need voltage or current measurements.

While it is true for acquiring acoustic signal, voltage correlation can be of great value for establishing a diagnostic. It was agreed in the group to clarify this sentence and to detail the relation between voltage, current and partial discharge in section 7.4 of the current revision of the guide.

The group will meet again in Vancouver for the fall 2016 meeting.

Adjournment

The meeting was adjourned at 12:15 PM.

David Larochelle

B 3.7 Working Group for PD in bushings, PTs and CTs – PC57.160 WG Secretary: Thomas Sizemore; WG Chair: Thang Hochanh March 21, 2015 at 4:45 – Atlanta, GA

Attendees: 50

Members attending: 15/28

Agenda: An agenda was presented for the meeting.

Minutes: Motion approved David Wallace (1st) & Vladimir Khalin (2nd)

1. Items discussed based upon comments received:

- 6.4 Discussed moving the key from this section to earlier in this document. Decided to move it appropriately after reorganization of the document. Likely just before balloting.
- Comment (Shibao Zhang) regarding addition of figure number to resolve comments in 6.4 and 6.5.1 figure 4.a and 4.b. Explanation was provided to clarify text and drawings. Updated version of the draft contained resolution.
- 6.5. 1st paragraph - Clarification on comment regarding calibration. No change was required to resolve the question.
- 7.1 “Casing connection”. New text was accepted to clarify the connection to the primary and ground.
- 7.1 b2 – Comment (Pierre Riffon) regarding the second test object was discussed and proposed text accepted.

Figure 5a and 5b – New test circuit to be provided by Vladimir.

- Incorrect connection fig. 5a and fig. 5b (Pierre Riffon), due to copy and paste action, will be corrected.
- Incorrect connection fig. 7a and fig. 9 (Pierre Riffon), due to copy and paste action, has been updated in draft 5.4 .

2. Presentation by Detlev Gross:

Detlev presented several PD patterns and the physical explanation for the partial discharges. Several questions were answered as this presentation was made. The first portion of his presentation was made speaking very generically. The second portion of his presentation was providing a number of specific examples. Numerous comments were made from Thang and Bertrand.

Detlev has agreed to make his presentation available to the attendees and the patterns may be used as part of the guide.

3. Additional discussion after the presentation:

Mario Lucano asked about the value of C2 in section 6.3.1. A short discussion was initiated. The chair will propose a new text to the group at the next meeting.

Fall meeting 2016: This WG plans to continue working at the Vancouver meeting.

Next version of draft: A new draft is being prepared to incorporate all of the recent comments and also to modify the format to match the IEEE style guide.

Date: 2016-03-22

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 March 22nd at 8:00 am – Atlanta, GA

Meeting called to order at 8am on Tuesday, March 22nd, 2016

Susmitha Tarlapally (ABB) chair (absent)

Diego Robalino (Megger) Secretary – chairing the session

Kris Neild and Mario Locarno – acting secretaries

Introductions of audience

Attendance:

- Total attendees: 62
 - From previous meeting 42 attendees
 - 4 requests to become members: Membership granted
 - Yang, Baitun
 - Yeboah, Kwasi
 - DeRouen, Craig
 - Prince, Jarod
 - New attendees 20

- 3 requests to become members: names recorded and will be added after two consecutive meetings attendance
- 26 members out of 44 attended this meeting; quorum has been established
- Reviewed agenda, approved motion by Ajith Varghese, second by Subhas Sarkar, passed by vote.
- Reviewed minutes from fall 2015 – First TF meeting in Memphis.
 - Charles Sweetser gave a description of the proposed database used in C57.104
 - Discussion by Baitun Yang (Pennsylvania transformer), and Diego Robalino about when testing should be done. Just on bushing or on fully assembled transformers.
 - Minutes from fall 2015 were approved, motion by Subhas Sarkar, second by Mark Perkins, motion passed.

- Michael Franchek, Dielectrics SC chair talked about the CDA process efforts that should provide a secure framework for collecting and sharing sensitive data. Confidentiality is a priority.

- **Reviewed TF scope**
 - Scope was modified based on comments from the participants. Diego updated the scope in his presentation. Update to include factory test (acceptance) and field commissioning.
 - Title was discussed to determine if it was appropriate for the testing limits being proposed. No changes were made to the title.
 - Approved scope, motion by Mark Perkins, second by Ajith Varghese, motion passed by majority vote.
 - Updated scope to go to SC meeting for final approval.

Task Force –Winding Insulation Power Factor & Winding Insulation Resistance Limits

- **Scope:-**

–Review and determine if factory acceptance and/or field commissioning limits can be established for winding insulation power factor and insulation resistance for power and distribution transformers and reactors that includes both mineral oil and alternate liquids.

- Reviewed table 100.3 from NETA2013
- Reviewed table 100.5 from NETA2013
- More discussion about what is to be measured, just windings or both winding and bushing. Field commissioning would include the bushing by default. Do we measure CH, CL, CHL?
- Question (from Mark Perkins ABB) as to what power factor measurements will be collected, overall or just individual components at this time such CH, CHL, CL?
- Suggestion from Charles Sweetser that perhaps different types of data could be collected, such as with or without bushings.
- Consensus was to see what the data presents should this group go forward.

- **Proposal – TF Purpose**
- This was reviewed and the same changes that were made to the scope were also made to the purpose. Reactors were added to the purpose.
- Diego updated the purpose in his presentation.
- Approved the changes to the purpose – motion by Mark Perkins, second by Subhas Sarkar, approved by majority vote.

Proposal – TF PURPOSE

- To confirm the need in the industry for factory acceptance and/or field commissioning limits of the winding power factor and winding insulation resistance tests
 - To provide a recommendation to the Dielectrics SC for further actions.
 - The TF should identify parameters influencing the dielectric response of IR and PF tests of liquid filled power and distribution transformers and reactors.
- Lively debate over the intended use of the term limits, decided that it was premature to discuss before the task force accomplishes its goal.
 - Data collection chart to be sent out for comments.
 - Made changes to the scope based on the changes that were made to the purpose. These changes included adding reactors and adding power and distribution transformers.
 - Re-approve the scope - Motion by Mark Perkins, second by Kirk Robbins, passed by majority vote.
 - Discussion on what data is to be collected in the database. Template was reviewed and will be sent to all members.
 - Presentation from Member Mr. Subhas Sarkar regarding PF/IR was shown. Material deemed info only, and the meeting came to end without enough time to discuss the presentation.

Review of volunteers. Lorne Gara added his name to the list of volunteers
 Motion to adjourn by M. Locarno, second by P. Patel, approved by majority vote
 Meeting adjourned at 9:19 am.

NEW SCOPE APPROVED BY SC DIELECTRICS @11:32 WEDNESDAY 23TH, 2016

B.4 Liaison Reports

B.4.1 Voltage Test Techniques (HVTT), IEEE Standard 4 - Arthur Molden

The Working Group of High Voltage Test Techniques (HVTT) Subcommittee met in conjunction with the IEEE PES, Joint Technical Committee Meeting at Memphis, TN on January 13th, 2016. There were 5 members and 2 guests present.

New and exciting projects discussed were:

Revision of IEEE 1122 Standard for Digital Recorders for Measurements in High-Voltage Impulse Tests. The PAR for this project has been approved

Revision of the 1983 edition of IEEE 510, IEEE Recommended Practices for Safety in High-Voltage and High-Power Testing. In preliminary stages of discussion. Par not yet applied for.

Application guide (tutorials) for IEEE Standard 4.

- i. Practical examples on impulse waveform evaluation
- ii. Practical examples on uncertainty analysis
- iii. Practical examples for creating / maintaining a Record of Performance

This work will necessitate formation of Task Force teams to focus on the various aspects of the revision and tutorial work.

Standard 4 Advisory Group. It was moved and approved at the last meeting of Dielectric tests, that a Standard 4 Advisory Group be formed and hold regular meetings during the Transformers Committee Meetings. The meetings would be used to make tutorial presentations on such subjects as are listed in the aforementioned Application guides.

The Standard 4 Working Group are actively soliciting members. Should anyone be interested in joining the Working Group or Task Force members, please contact Jim McBride or myself for details.

The next HVTT WG meeting will be at the Fall Switchgear Meeting at Pittsburg PA, October 9th to 14th, 2016.

END

A. Molden 3/23/2016

B.5 Discussions

- WG on external clearance reported that their work is ready to survey. Modified section will include phase to ground clearance in-addition to phase to phase clearance. A motion to survey modified text and table in subcommittee was moved by Eric and seconded by Phil Hopkinson. Motion was passed unanimously.
- As a follow up of motion passed in Task force meeting on Insulation Power factor and insulation resistances, scope of Task force presented the defined scope to sub-committee. Motion was moved by Diego Robalino and was seconded by Peter Werelius. The motion was approved unanimously.

The approved scope of Task Force will be.

Review and determine if factory acceptance and/or field commissioning limits can be established for winding insulation power factor and insulation resistance for power and distribution transformers and reactors that includes both mineral oil and alternate liquids

B.6 Old Business

Chair presented the results of survey on revised text of subcommittee scope for transformer committee O& P manual which was surveyed.

Survey results Returned – 30 (25.4%) Affirmative – 27 (90.0%) Negative – 3 (10%)

Chair presented the revised text which incorporated editorial comments from survey. Below is the revised text as presented.

The Dielectric Tests Subcommittee shall be responsible for the following:

- a. Studying, reviewing and establishing the test requirements necessary to determine that dielectric withstand capabilities are met for liquid immersed transformers and reactors, under normal and transient conditions.*
- b. Developing and maintaining related standards, recommended practices, and guides for such criteria*
- c. Coordinating with other technical committees, groups, societies, and associations as required*

Motion to approve revised text as presented was moved by Bertrand Paulin and seconded by Kenneth Stinger.

Joe Watson commented to include the wording “service requirement”. Jeff Britton wanted to know if dry type transformer was included which was clarified as out of scope.

Motion was passed as presented with all supporting except 1 voting against.

B.7 New Business

Phil Hopkinson brought a new item for discussion regarding **effect of High frequency transient from breaker operation on transformer**. Per Phil, Circuit Breaker size/capacity has increased over the year and effect of transients under these conditions are not fully understood and wanted to re-introduce Steep Wave (Front- of – Wave) testing during final acceptance test as way to mitigate transformer failures due to these transients.

Discussion the followed questioned Front of wave as effective test to transient seen under these condition. Detlev noted that waveform under circuit breaker operation is different and have high frequency transients which is different from Front of wave. Dave Geibel pointed out that issues should be addressed to prevent fast transients from reaching the transformer than protecting the transformer under these condition. Bertrand Paulin noted that there is already a task force led by Jim McBride dealing with switching transient and suggested to expand the scope of TF to include this topic. Jim Graham clarified that, it is okay for DTSC to request Performance Characteristics SC to expand the scope of TF to include this topic.

After discussions a motion was passed to request Performance characteristic subcommittee to expand the scope of “ TF of Switching transients induced by transformer-Breaker interaction PC57.142 chaired by Jim McBride” to expand the scope to include “ Investigate effect of high frequency transient on transformer and identify mitigation which may including additional factory testing or prevent transients from reaching unit “. Motion was moved by Phil Hopkinson and seconded by Craig Stiegemeier. Motion was approved unanimously.

B.8 Adjournment

Meeting adjourned 12.05 PM.

Minutes respectfully submitted by:

Ajith M. Varghese

Secretary DTSC.