7.6 Dielectric Test Subcommittee – Loren B. Wagenaar; Chairman, Stephen Antosz, Secretary

The Dielectric Test Subcommittee (DTSC) met on Wednesday, October 8, 2003, at 1:30 p.m., in Pittsburgh, PA with 67 members and 45 guests present. 9 of the guests requested membership on the Subcommittee. See the last page of these minutes for attendance list.

7.6.1 Chairman's Remarks

After introduction of the attendees, the Chair reviewed some of the highlights of the Administrative Subcommittee meeting held on October 5, 2003.

1) Minutes due to Don Fallon and Sue McNelly on November 21.

2) Next meeting dates and locations are as follows: March 2004 in San Diego, CA. Potential hosts for future meetings should contact Greg Anderson (gwanderson@ieee.org).

3) Minutes of the Raleigh meeting are available on the IEEE Committee Web Site.

4) A recurring problem needs to be addressed within the Committee regarding Reaffirmation Ballots: people are voting Negative regarding the content rather than reaffirmation. Everyone needs to understand the intent of a Reaffirmation Ballot better – and this will be addressed in the Instructions to Balloting Pool.

5) A question was raised on the value and format of the Main Committee meeting on Thursdays. Should these be restructured in some way to make better use of the time? The "valuable parts" are the administrative announcements and awards. The SC reports are not so valuable anymore, especially since these are all easily accessible on the transformerscommittee website.

   A motion was made and voted on to cancel the Thursday meeting altogether, and conduct the "valuable parts" during a Wednesday luncheon. In effect this would reduce the conference from 3.5 days to 3.0 days. By hand count of those in attendance, 80 were in favor and 9 opposed. This is a non-binding motion, serving only to give the Administrative SC an idea of the members feelings, which will be considered along with other suggestions.

6) In the future the Diel Test SC minutes will not be sent by email due to file problems sending (large) attachments to large numbers of recipients. Many email systems are rejecting them due to virus or spam concerns. It will be considered just to send a brief text email with no attachment, giving a link to the website, and instructions on how to access the minutes and other information once it is all posted. The SC minutes will not require a username and password, but WG/TF documents are on a more secure part of the site and do require use of the username and password.

   Sue McNelly will add a link to the website for each WG and TF to keep files. This part of the site will be secure and will require the username and password. Chairmen are encouraged to utilize this more, and send the files to Sue.

   There is only one username and password for ALL secure parts of the website. The question was asked, "How secure is this then, if everyone has access?" Much discussion ensued, and it was decided to continue this as is. If a WG or TF truly has some sensitive information to work on, it can still be sent via email to the select individuals who are necessary.

Bipin will provide info to Sue and Greg on a new IEEE service related to this.

7) The Administrative SC is working on the idea to create and maintain ONE central roster with people's contact information, rather than all the various TFs, WGs, and SCs having separate rosters. This will greatly simplify much of the attendance and membership issues. It will be each individual person's responsibility to contact the Chairman if email address changes … not vice versa.

8) The minutes of the Spring 2003 meeting in Raleigh, NC were approved as written

Note: Individuals who wish to receive invitations to ballot on IEEE Standards have the responsibility to make sure their correct e-mail address is on file with IEEE. Status can be checked on the following website, or adjacent related websites:
http://standards.ieee.org/db/balloting/ballotform.html

7.6.2 Working Group Reports

7.6.2.1 Working Group on Partial Discharge Tests in Transformers - J.W. Harley, Chair

Attendance: 32 members and 25 guests attended the meeting. Attendees introduced themselves.

Ron Daubert, Mark Perkins, Hem Shertukde and Barry Ward led WG attendees in reviewing the many changes made at the last meeting to the PC57.127/D2.0 Draft Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors.

7.6.2.2 Working Group on Revision of Low Frequency Dielectric Tests - Mark Perkins, Chair

The status of C57.12.90 will be balloted again in November 2003 due to changes in the IEEE metrification policy.

The new survey on eliminating temperature correction of power factor to the WG and Diel Test SC is in progress. Of the 18 returns, 17 were affirmative, 9 with comments. One negative was in regard to wording rather than intent. The WG recommended revisions to the proposed text. Next meeting will try to resolve this issue and complete a recommendation to be incorporated in the next revision of C57.12.90.

The next item was on formation of a new Task Force to revise C57.113 Partial Discharge Guide. Dr. Eberhard Lemke will chair this TF which will meet for first time in San Diego. Five people volunteered to be members, and others are encouraged to join as well.

New Business, Subhash Tuli suggested to add a sentence to C57.12.90 stating that for windings with a rated voltage less than 115 kV, no PD measurements are required and guaranteed levels do not apply. This will be discussed at the next meeting.

7.6.2.3 Working Group on Revision of Impulse Tests – Pierre Riffon, Chair; Peter Heinzig, Vice-Chair

The WG met on October 7, 2003, from 3:15 pm to 4:30 pm. 19 members and 19 guests attended the meeting. The minutes of the Raleigh meeting were approved as written. The agenda has been approved as written.

The main subject on the agenda was to review a new proposal regarding the minimum impulse generator energy level to be met during lightning impulse tests for cases where the 50% tail time is shorter than the minimum allowable value of 40 µs. Decisions taken during the previous Raleigh meeting as well as the inputs received since were considered in the new proposal.

This main changes made are:

- Categories IV has been split in three different categories IVa, IVb and IVc because the former Category IVb was covering a too wide power range. This allows to reduce the recommended energy level for the mid-band of that particular power range.
- The recommended energy level for Category IVc (> 160 MVA, single-phase or > 480 MVA three-phase) has been reduced from 100 kJ to 62,5 kJ in order to cope with most of the test laboratory capabilities.
- Recommended, not mandatory, minimum energy levels are now given for all Class II transformers and for Class I transformers belonging to Categories III and IV.
- A minimum recommended, not mandatory, capacitance of 1,0 µF is now given for Class I transformers belonging to Categories I and II.
- Use of resistors on non-impulse terminals is now allowed as alternative methods when the tail time can not still be achieved with the recommended energy level or capacitance value. The resistor value shall be minimal for obtaining the minimum required tail time of 40 µs.

After review, apart some editorial corrections and clarifications, the following technical changes were agreed upon:

- Category II will be extended to 3333 kVA single-phase and 10000 kVA three-phase.
- The resistor value for cable connected transformers will be limited to 30 Ω.
- The recommended efficiency value of the impulse generator to be used in the formula given for the estimation of the tail time will be changed from $\eta = 0,8$ to 1,0.
- Deficiency to meet the minimum recommended energy or capacitance values shall be notified by the manufacturer at the biding stage. The strategy for achieving the tail time shall also be described by the manufacturer at the bidding stage.
- A shorter waveshape may be accepted by mutual agreement at the bidding stage.

This new proposal, taking into account the decisions taken during the meeting, will be surveyed within the Dielectric Tests SubCommittee prior to the next meeting.

7.6.2.4 Working Group for Revision of the Impulse Test Guide C57.98 – Art Molden, Chair; Joe Melanson, Secretary

This meeting took place on Monday, October 6th at 3:15 PM, there were 18 members and 17 guests present, one of the guests requested membership. Introductions of Members and Guests. The minutes of our spring, 2003 meeting were approved. Items discussed at this meeting were:

1. Pierre Riffon provided a document proposing a test sequence to be used when impulse testing transformers that include non-linear protection devices. Pierre proposed a sequence of shots that included reduced full waves (RFW) from 50% to 90%, then two chopped waves, followed by two100% full waves, then, a repeat of the RFW shots in reverse order back to the 50% level. The intention being to start a sequence of RFW at a voltage level below that at which the non-linear devices start to operate, to duplicate RFW shots before and after the 100% level shots and to apply two 100 % shots. The duplication of the shots at the various levels provides the means for comparison of the records There was another suggestion proposing the sequence could also be 50% to 90%, then a 100% full wave, two chopped waves, one 100% full wave and then reversing the reduced wave sequence back to 50%. The group felt that the second sequence, which was already in use at some vendor's plants, was equally suitable and Pierre agreed to this modified sequence being included in his proposal.

2. Steve Beckman pointed out that the present test code includes wording to the effect that the 100% full wave be the final impulse test applied to the terminal under test. The question was how to comply with the Standard if a series of reduced waves were applied "after" the final full wave. Art Molden suggested that the present wording in the test code could be modified to include the special case of tests on transformers that include non-linear devices. This could be an item addressed in the WG for revision of impulse tests and Pierre, the WG chair for that group agreed to include this in his agenda.

3. There was also discussion recommending that the non-linear devices should not operate during switching impulse (SI) tests. The reason given was that the currents during switching surge were higher than the device's normal operating levels and the devices could be damaged by higher temperatures caused by the high currents. Also, during SI testing, the distribution of voltage in the transformer is more linear and so the voltage levels occurring on the non-linear devices would be much lower than occurs during LI testing. Some wording along these lines will be included in the guide

4. Ernst Hanique inquired about whether or not to continue including information relative to analogue scopes in the guide. The group felt that there was still some necessity to include the information in the standard, given that some manufacturers still use them for impulse tests.

5. Transfer function information provided by Earnst Hanique was discussed, with a request being made for Earnst to provide more examples of transfer functions for the guide. Pierre Riffon asked for clarification of the reasoning behind using the transfer function waves in the guide. His concern was that it was not to be used as an acceptance criterion during impulse tests. The discussion concluded with recognition that it's main purpose would be for diagnostic purposes.

6. Art Molden indicated that we need to make more progress in revision of the guide and that Joe Melanson would try to get more volunteers to begin the actual changes to the guide. The plan is to have a draft version of the guide ready for the fall 2004 meeting in Edinburgh, Scotland. Volunteers were solicited and Subhash Tuli, Tom Harbaugh, Ron Daubert and Thang Hochanh agreed to participate in the process.

7. A discussion was held concerning the location and connection of the voltage divider during impulse tests. The guide recommends that the voltage divider be close to the test object. Some concerns were raised concerning clearances between leads of the generator, chopping gap and voltage divider. A suggestion was made to consider the wording used in the IEC document concerning this topic and to include similar wording in the revised guide.

8. The question of a Glanninger circuit application for short tail impulse applications was raised. Reto Fausch has agreed to provide the group with more information about Glanninger circuit and its effects on wave tail times for the next meeting.

9. Subhash Tuli asked if the guide would consider recommending voltage and time duration tolerances applicable during SI tests on transformers. Subhash pointed out that it can sometimes be difficult to meet the requirement for time duration above 90% and still comply with the requirement for the SI risetime. He also requested that we consider adding information regarding the use of loading resistors on the non impulsed terminals during SI tests. Art Molden pointed out that the WG for revision of impulse tests already has items relating to SI testing on their agenda, we will be working with them on these issues and we will include appropriate wording in our guide. Art also pointed out that the IEC standard already addresses the use of loading resistors during SI tests and we would be reviewing that information for use in our guide.

10. Steve Beckman indicated that the guide should include a statement recommending that the customer be included in the decision as to which of the proposed alternative methods is used for an impulse test when a low impedance winding causes a short tail time. The concern was that some manufacturers do not discuss whether to use any of the four methods for short tail compensation with the customer. Appropriate wording will be included in the revised guide.

7.6.2.5 Task Force on Liquid-Filled Transformers Dielectric Test Table – Phil Hopkinson, Chair; Scott Choinski, Secretary

a.) Mission and Scope – Develop a more easily read group of Dielectric Test Tables with fewer footnotes

b.) Review from Raleigh meeting
- Used transformer should be referred to as service aged
- In warranty should be tested at 100%
- Out of warranty should be tested at 85%

c.) Tables needed and proposed
- Wye-Connected Test Levels
- Delta-Connected Tst Levels
- Chopped Wave and Switching Surge vs BIL
- Relationship Between Short And Long Time
- Arrester Protection Levels – Wye
- Arrester Protection Levels – Delta
- Commentary on Considerations for Delta and Wye

d.) Marked up C57 10.00

7.6.3 Liaison Reports

7.6.3.1 Surge Protection Devices – Bob Degeneff

Nothing to report.

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

The last meeting was held at the Golden Arrow Hotel in Lake Placid NY on February 10 & 11, 2003, with ten members present. Discussion of proposed revisions to Standard 4 occupied most of the meeting. While it is still the intent of the HVTT committee to perform the "Round Robin" ac and impulse voltage calibration checks, as previously reported, scheduling of the calibration of the Working Group's measurement standards has been problematic. Those members having expressed an interest in this work will be contacted when the equipment is ready.

7.6.3.3 PCS TF on Frequency Response Testing – Rowland James

The PCS task force met for the development of a guide for Frequency Response Analysis (FRA) in Pittsburgh, Pennsylvania on October 7, 2003 at 3:15 P.M. There were 40 persons in attendance, 10 members and 30 guests of which 13 guests requested membership.

Rowland James made a brief report on the development of the draft. Charles Sweetser presented a newly condensed outline consisting of six sections. The sections are as follows:

Section 1 - SCOPE AND APPLICATION
Section 2 - FRA TEST PARAMETERS
Section 3 - MAKING AN FRA MEASUREMENT
Section 4 - TEST RECORDS
Section 5 - ANALYSIS AND INTERPRETATION
Section 6 - APPENDIX: FRA THEORY

Members were assigned for contribution according to their expertise for each section. The following members were assigned:

Responsibility	**Section 1**	**Section 2**	**Section 3**
Primary	Mark Perkins	Ernst Hanique	Charles Sweetser
Secondary	Joe Watson	Richard Breytenbach	Paulette Payne
Secondary	Jin Sim	May Wang	Jeff Brittton
Secondary	Rowland James	Larry Coffeen	
	Section 4	**Section 5**	**Section 6**
Primary	Barry Ward	Charles Sweetser	Bob Degeneff
Secondary	Bertrand Poulin	Larry Coffeen	
Secondary		Richard Breytenbach	

Fred Elliott of BPA presented a short report on experience of FRA testing. The report focused primarily on the transportation of transformers and reactors. Fred's examples included apparatus with and without oil. All of the results indicated that no shipping damage had occurred.

7.6.3.4 Web Page Development – Eric Davis

- Secure Site Access
  - The Password is changed twice a year and is provided at the Main meeting.
  - Username: xfmrcom; Password: Trcom4acc (case sensitive). Effective date is 10/10/03
  - Sue will address the issue in her email of people who foget the password

- Archives
  - Minutes for last 3 meetings are available on the website in MS Word and pdf
  - Minutes for other meetings back to 1998 are accessible on a separate page, and only in pdf format

- Tutorials
  - Presentation being recorded using "Cantasia"
  - It captures the audio in real time with the slides
  - The files are extremely large, and will be available on the website for about 1 month
  - Greg will investigate burning CD's

- Subcommittee Pages
  - Sue has created forms for WG & TF chairmen to fill out to provide basic information and updates about their group's activities. Send these forms to Sue.
  - The scope might contain information about the PAR scope, actions, schedule, etc.
  - Drafts, etc for the secure website should also be sent to Sue

7.6.4 Old Business

7.6.4.1 Phase to Ground Clearances – Loren Wagenaar

Loren sent an email on July 16 summarizing the issues, and showing the NESC which is safety not insulation coordination clearances.

Loren sent a ballot with 4 questions. There was very low (less than 10%) response. A handful of people in the audience don't remember receiving it, so Loren will resend.

Some felt that the NESC Tables should not be repeated, but at least some phase-ground clearances should be included in C57.12.00 … maybe should use the present IEC ph-grd clearances. Loren will circulate a proposal, for discussion at San Diego meeting.

Loren found his folder with much information on phase-phase clearances, will summarize and send this out in next few months.

Phase-ground distance could have major impact on bushing manufacturers, who have their own set of clearances. Consideration should be given to the idea that this should not set straight-line bushing top to flange dimensions as this is affected by grading of the bushings and creepage of the porcelain. Loren will discuss these issues with Prit Singh.

7.6.5 New Business

7.6.5.1 C57.138, Recommended Practice for Routine Impulse Tests on Distribution Transformers – John Rosetti

Will send reaffirmation ballot. It is in process at IEEE.

Dielectric Test Subcommittee – Meeting Minutes
October 8, 2003 – Pittsburgh, PA

Members Present

1. Antosz, Stephen
2. Artiega, Javier
3. Barker, Ron
4. Barnard, David
5. Beckman, Stephen
6. Boettger, Bill
7. Britton, Jeffrey
8. Bush, Carl
9. Chiu, Bill
10. Corkran, Jerry
11. Crouse, John
12. Damico, Frank
13. Darwin, Alan
14. Daubert, Ron
15. Davis, Eric
16. Degeneff, Bob
17. Dohnal, Dieter
18. Dudley, Richard
19. Elliott, Fred
20. Fallon, Donald
21. Fausch, Reto
22. Field, Norman
23. Foldi, Joe
24. Franchek, Michael
25. Fyvie, Jim
26. Ganser, Robert
27. Gardner, James
28. Garnitschnig, Andreas
29. Griesacker, Bill
30. Gruber, Myron
31. Haggerty, Kent
32. Hanique, Ernst
33. Hartgrove, Bob
34. Hayes, Roger
35. Heinzig, Peter
36. Henning, Bill
37. Hochanh, Thang
38. Holland, John
39. Hopkinson, Philip
40. Huff, Tim
41. James, Rowland
42. Kennedy, Sheldon
43. Khalin, Vladimir
44. Lackey, John
45. Leuenberger, Boyd
46. McNelly, Susan
47. Miller, Kent
48. Molden, Arthur
49. Patel, Bipin
50. Perkins, Mark
51. Platts, Don
52. Preininger, Gustav
53. Puri, Jeewan

Guests Present

1. Alvaro Cancino
2. Barry Beaster
3. Paulette Payne
4. Charles Caruso *
5. Eberhard Lemke *
6. Jane Ann Verner
7. David Wallach
8. Jonathan Mark Cheatham
9. Brent Hayman
10. Guy Morrissette
11. David Aho
12. Al Traut
13. Allen Mitchell *
14. Bob Sterner *
15. Marcel Fortin
16. Mike Lau
17. Joe Kelly
18. Klaus Papp
19. Juan Castellanos
20. Tom Bassett
21. Matt McCormack
22. Christoph Ploetner
23. Bob DelVecchio
24. Ken Hanus
25. Ali Gharfourian
26. Alan Wilks
27. Larry Lowdermilk *
28. Bruce Fairris
29. Joe Nims
30. Jean Christoph Riboud *
31. Richard Musil
32. C.J. Kalra
33. Ramon Garcia *
34. Hyo Chul Roh
35. Batric Mihailovic
36. Yunxiang Chen *
37. Dana Basel *
38. Michael Williams
39. Wes Patterson
40. Steve Jordan
41. Paul Ahrens
42. Pritpal Singh
43. Peter Zhau
44. Dom Corsi
45. Van Nhi Nguyen

* Requested Membership.

54. Raymond, Tim
55. Riffon, Pierre
56. Rivers, Mark
57. Schweiger, Ewald
58. Sharma, Devki
59. Sim, Jin
60. Snyder, Steve
61. Speegle, Andy
62. Stiegemeier, Craig
63. Subramanian, Raman
64. Thompson, Robert
65. Tuli, Subhash
66. Wagenaar, Loren
67. Ziomek, Waldemar