9.12 Dielectric Test Subcommittee - L.B. Wagenaar, Chair

The Dielectric Test Subcommittee (DTSC) met on Wednesday, October 17, 2001, at 1:30 p.m., in Orlando, Florida, USA at the Rosen Centre Hotel, with 43 members and 44 guests present. 11 of the guests requested membership on the Subcommittee. They include: Jeffrey Britton, Larry Coffeen, Tom Harbaugh, Roger Hayes, Thang Hochanh, Dave Kendrick, Sheldon Kennedy, Vladimir Khahlin, Mike Mitelman, Thomas Traub and Albert Walls.

9.12.1 Chair's Remarks

After introduction of the attendees, the Chair reviewed some of the highlights of the Administrative Subcommittee meeting held on October 14, 2001. (See Section 4.0 of IEEE/PES Transformer Committee meeting minutes from the Amsterdam, Netherlands meeting for additional details of the Administrative Subcommittee meeting).

The chair's remarks and announcements are not produced in entirety here as some of the information is covered in other parts of these minutes.

In the future all of the DTSC minutes, agenda and other correspondence will be sent via e-mail. It is very important that we get your correct e-mail on the DTSC membership roster.

The secretary will review the attendance at the past four meetings to see who has not been attending the meetings. Those who have not been attending will be sent a letter thanking them for their past participation but will be told that they are being removed from the membership roster unless they specifically request to stay on the list.

The minutes of the meeting held on April 17, 2001 in Amsterdam, Netherlands were approved as written.

9.12.2 Working Group Reports

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

21 members and 23 guests attended the meeting.

Minutes of the previous meeting April 10, 2001 in Amsterdam, The Netherlands were approved.

Discussions continued on the Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors. The Working Group was split into four subgroups led by Alan Darwin, Ron Daubert, Mark Perkins and Hem Shertukde. My thanks to them and the other participants for a highly productive meeting. Sections on basis acoustic PD systems, specifications, field and shop testing and characterization of signals were reviewed.

Comment of Chair: The tutorials or seminars slots are filled for the next meeting in Vancouver, BC, but at a future meeting the working group should give a seminar on what they have done in developing the guide.

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

The working group met Monday, October 15, 2001 at 3:15 PM with 17 members and 31 guests present. 10 people applied for membership in the working group. After the introduction of members and guests, the minutes of the last meeting in Amsterdam were approved.

The chairman then reviewed the results of the survey on changes to C57.12.90 that was conducted. The survey, which consisted of four separate items relating to low frequency dielectric tests, was e-mailed to 130 members of the dielectric test subcommittee and working group on low frequency tests. 31 responses were received. The working group reviewed the results and approved the following actions:

Item 1, on the question of removing note on Section 4.3 of C57.12.90, received 18 yes votes, 11 no votes, and 2 abstained. Based on the number of people who wanted the note to remain, it was unanimously agreed to leave the note in the standard. Possible changes in the wording will be considered in future meetings.

Item 2, on the instructions for control wiring dielectric test, 23 people voted yes, 6 voted no, and 2 abstained. It was agreed unanimously to change the duration of the test from a "maximum of 1 minute" to "1 minute". It was also unanimously agreed that the test could be performed at either 50 or 60 Hz. The group agreed that it did not matter if the test was done at 50 Hz or 60 Hz.

The working group considered Loren Wagenaar's request to lower the test voltage to 1000 v for contacts not rated for tripping; however, this was not accepted by a vote of 4 in favor, 40 opposed.

Item 3, on tests for repaired or rebuilt transformers, the survey results were 25 yes, 4 no, and 2 abstained. Based on negative votes, it was proposed to change the recommended test levels from a range of 75 to 85% to 85%. It was also agreed to place the section in an annex rather than in the body of the standard since it is more of a guide than a standard.

Item 4, on changes in the table for power factor temperature correction, the vote was 14 yes, 10 no, and 5 abstained. Since the majority of negative votes addressed the reasons for having separate correction factors for EHV transformers and power transformers, it was proposed and agreed to eliminate the column for EHV transformers and use the correction factors of power transformers for all power transformers, including EHV.

A new survey will be prepared with the above recommended changes and sent to the working group and subcommittee for comments. Justification for the new power factor temperature correction factors will be included.

The working group adjourned at 4:40 PM.

9.12.2.3 Working Group on Revision of Impulse Tests - Subhash Tuli, Chair

The working group on Revision of Impulse Tests met on October 16th at 3:15 PM. Thirteen members and 6 guests attended this meeting. After introduction status of various standards related to Impulse tests were discussed.

Status of IEEE Std. C57.98-1993, "Guide for Transformer Impulse Tests"

This guide was reaffirmed in 1998 with minor additional changes The PAR for this standard had expired during 1995. There is an urgent need to return this document to active status and the PAR needs initiation before the next meeting. During the meeting upon request by the WG chair, Arthur Molden volunteered to chair the task force meeting to start working on this guide towards its completion.

Status of IEEE Std. C57.12.00: "Standard General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers

WG chair urged all the attendees to offer their comments concerning any areas for enhancement/improvements of the contents of this standard so that the new items of interest to all users can be added to the next revision of this standard.

Status of IEEE Std. C57.12.90, "Standard Test Code for Liquid Immersed Distribution, Power and Regulatory Transformers"

During the last revision of this standard, the requirement of up dating the state of the art impulse wave measurement WMF Digitized Technology for recording and analysis are at most required. The enhancement of this clause related to impulse wave measurement is a top priority of this WG. A need to add voltage and time tolerances for chopped and switching impulse waves were also discussed along with few details of amplitude after the impulse wave is chopped. Slope of the chopped wave upon flashover also needs to be looked into and needs to be discussed at all approval levels.

WG chair requested another volunteer as a Task Force chair to lead the revision of Impulse Test for Standard C57.12.00 and C57.12.90. Pierre Riffon volunteered to chair this task force.

Pierre Riffon already presented several tutorials in the past WG meetings which is the scope of this subject.

Several items of new Impulse Test requirements were also discussed during the meeting. There is also our urgent need to update measurement techniques and evaluation of normal and abnormal recordings during transformer impulse tests.

The chair will also initiate a new PAR for the revision on Impulse Guide C57.98-1993. This guide will cover present changes in the other standard and stay in line with the revision of C57.12.00, C57.12.90 and changes in impulse tests.

9.12.2.4 Task Force on Liquid-Filled Transformers Dielectric Test Tables - Phil Hopkinson, Chair

There were 23 members and 22 guests, 10 of which desired new memberships, for a total of 45 people in attendance.

The purpose of this working group is to revise the dielectric test tables of C57.12.00.

The chairman reviewed the following documentation:

- Minutes of Amsterdam
- Decisions from Amsterdam as reflected in the changes in the draft
- The present charts as they exist

Then WG has an extended discussion of the test levels for repaired transformers. This discussion is a carryover from Mark Perkin's work in C57.12.00 and its proposal to use the 75% value in testing re-worked transformers. The value is at odds with the views of others in WG 57.12.00 and 57.12.90. They suggest this level should be at 85% level. The WG has agreed to look more deeply into this matter and to take it up in Vancouver, BC meeting.

One of the issues discussed was proposing "preferred test levels". There is a mixed response to the proposal given, it was noted that the existing C57.12.00 document does implacably direct the reader to preferred values. WG agreed to study this requirement in great detail.

Members agreed to survey the entire WG for additional comments on the current draft tables. This survey is intended to identify any existing major issues to be added before submitting the document to a formal WG ballot.

The meeting was adjourned at 3:10 PM.

Comment of Chair: Recommended that the entire subcommittee be surveyed.

9.12.4 Liaison Reports

9.12.4.1 Insulation Coordination – John Crouse

(No report)

9.12.4.2 Surge Protection Devices – Bob Degeneff

(No Report)

9.12.4.3 IEC TC14/WG24 – Loren Wagenaar

The Chair had reported at the last meeting in Amsterdam that the WG was to meet in September 2001 but the meeting is actually scheduled for 2002. The Chair has the latest revision of the IEC Impulse Guide. Anyone interested in a copy please request it from Loren Wagenaar.

9.12.4.4 High Voltage Test Techniques (HVTT) – IEEE Standard 4

Arthur Molden - Liaison

The last meeting of the working Group was held in West Palm Beach, Florida, USA on April 9-10, 2001, with 16 members present. The main topics discussed at this meeting were the membership policies with a view to establishing a common and consistent membership policy. A request was made to the Liaisons present to provide a copy of the respective groups membership policy and membership eligibility forms. IEC activities require that all HVTT members become a TAG member, the annual cost is $250.

The latest draft of IEC Standard on Sphere Gaps (IEC – 600052) was reviewed section by section with the purpose of harmonizing the sections of Standard IEEE-4 that deal with Sphere Gaps. Two round robin tests will be completed to obtain test data from various sites. This project has been under way for several years.

Impulse round robins will also be done, the equipment requirement for these tests is complete and testing will starting at NRC in Canada. It is still possible to add test site to this test series, and those interested should contact A. Molden.

Two Liaison members were present at the meeting (Mel Smith – Switch Gear Committee and Arthur Molden – Transformer Committee). M. Smith reported that the Switch Gear Committee is referencing IEEE-4 in the IEC document.

Arthur Molden opened the discussion on altitude correction factors. This issue was not new to the members of the WG and there was a strong consensus that the present method of gradually applying approximately 1% per 100 meters above 1000 meters is the correct way to apply the correction factor.

The other question raised was if there was any work currently being done in that area of digital measurement of partial discharges. A. Molden reported that there is a WG working on a guide for the detection and location of acoustic admission of PD. He will update the members at the next meeting on this subject.

The main work completed at this meeting of the HVTT was the review of a T&D paper that compares IEEE-4, 1978 with IEEE-4, 1995. It also compared IEEE-4 1995 to the

present IEC 60-1 and 60-2. The result of this review by the group will be presented at a panel session. This paper will be the basis of a revision of IEEE-4. It was suggested that the members of the Transformer Committee review IEEE-4 and send comments on its revision to A. Molden by e-mail (a.molden@IEEE.org). A. Molden, along with two other members will be looking at the sections of IEEE-4 that concern impulse testing for the revision.

The meeting was adjourned at 2:00pm on April 10, 2001.

Comments: Subcommittee members were requested to review the old C57.98 (Impulse Test Guide) and be prepared to discuss revisions to the document at the Vancouver, BC meeting. A. Molden also requested that manufacturers and users provide oscillograms of certain types of faults that have occurred during impulse testing. These will be placed in the new guide as a reference. These new oscillograms will replace the old Polaroid photos in the old guide.

9.12.5 Old Business

9.12.5.1 Altitude Correction Factors – A. Molden

As reported above, the working group of IEEE-4 is in favor of keeping the present method of applying the altitude correction factors. This current method is to use a correction factor at 1000 meters of 1.0 and de-rate the correction factor from there. It was noted that the relative air density factors have been used for a long time without any known problems with this correction factor. The Chair made a motion that he write a letter to the Main Transformer Committee recommending that the altitude correction factors do not change, that is, the correction will start at 1000 meters with the value of 1.0 and be de-rated from there. The motion was past by the subcommittee.

9.12.5.2 Phase to Ground Clearances – Bill Chiu

Subhash Tuli and Bill Chiu have been working on phase-to-ground clearances.

Bill Chiu presented a table and chart that compared the phase-to-ground clearances from several different sources (see attached 2 pdf files). There is a fair amount of inconsistency in the different sources of data. The reason that B. Chiu and Subhash Tuli started gathering this type of data was to develop a new Table in C57.12.00 that shows phase-to-ground clearances. It was decided by the Subcommittee that this type of table was needed.

It was pointed out that that there were inconstancies between NEMA TR-1 and IEEE C57.12.00 for 230 kV class transformers. It was felt that these type of inconsistencies need to be addressed in any new table that is developed. L. Wagenaar was a member of the original WG that developed the information for Table 13. He has some of the old documentation on the development of these tables that he will review. There are also inconsistencies between IEC 76-3 and IEEE Table 12. It was requested that B. Chiu add the NESC (National Electric Safety Code) clearances to his data. This will be reviewed

at the next meeting in Vancouver, BC. It was pointed out that the NESC clearances are for personal safety and not design of equipment.

9.12.6 New Business

9.12.6.1 Frequency Response Measurements - FRA

Background

The Main Transformer Committee received a request from a transformer manufacture for the Committee to review the need to develop standards for conducting frequency response measurements (FRA). This subject was discussed at the Performance Subcommittee.

Meeting Discussion

The feeling of the Chair was that this request should be handled by the Performance Subcommittee. It was pointed out that this test is really an impedance test and belongs in the PSC, Chaired by Don Fallon. The feeling of PSC was that since it also involves dielectric testing methods that PSC would like to have input on this subject from the DTSC. It was the feeling of the PSC that the FRA test is still in the developmental stage and that more data is needed to improve the interpretation and make the data more meaningful. It has been proposed that this FRA subject be introduced at the Main Transformer Committee meeting and that if there is interest that a Discussion Group be assembled at the meeting in Vancouver, BC. The purpose of this Discussion Group will be to plot a course of action on this issue. It is that intent that the Discussion Group will be on the meeting agenda for the next meeting.

9.12.6.2 Other Business

Tutorials: There are a couple possible tutorials that could come out of Jack Harley's and Mark Perkins' Working Groups. One possible one could be Digital Recording Devices. Please let the Chair know of any good subjects that could be presented in future meetings.

There being no new business the meeting was adjourned at 2:45 pm.

Minutes submitted by Michael Franchek