**12.2.1 Introduction**

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| **Dielectric Tests Subcommittee** | | | |
| **Chair: Michael Franchek** | **Vice-Chair: Thang Hochanh** | | **Secretary: Ajith M. Varghese** |
| Room : Landmark 1-2-3-4 | Date : Wed, October 23 ,2013 | | Time: 11:00 am to 12:15 pm |
| Members : 114 | Member’s Present : 83 | | Guests : 117 |
| Membership requested during S13 : 12 | | Membership accepted: 12 | |
| New membership requested during F13 : 10 | |  | |

* + 1. **Chair’s Remarks**
       1. The Chair briefly highlighted the requirement that while introducing one need to state their employer/ company and sponsor if difference from company in addition to name.
       2. Chair introduced Ajith M. Varghese as new Secretary of Dielectric Subcommittee replacing Dennis Marlow.
       3. The Chair recognized the former Dielectric Subcommittee Chair of 17 years, Loren Wagenaar.
    2. **Quorum and Approval of Minutes**

* + - 1. 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. 83 out of 114 members attended, so there was a quorum
      2. The revised minutes of the spring 2013 meeting in Munich were approved without correction.
    1. **Working Group Reports**

**12.2.4.1 Working Group on External Dielectric Clearances, Eric Davis, Chair; (Vacant), Secretary**

The Working Group met on October 21, 2013 at 9:30 am with 63 people attending the meeting; 12 of 13 members, zero of 3 corresponding member, and 51 guests. A quorum was achieved.

David Wallace moved that the Spring 2013 meeting minutes be approved as written. Dan Sauer seconded the motion. There was no discussion. The motion passed unanimously.

The WG Agenda was reviewed. There were no revisions or additions to the agenda.

The WG reviewed the results of the survey on the proposed clearance table for 1.2 through 230 kV. The discussion focused on the seven negative responses to the proposed clearances. These responses covered three basic issues:

* The clearances are lower than those contained in the IEC and CSA standards
* The NEMA TR-1 clearances were not matched correctly with BILs in the proposed table
* The clearances are too small and should be based on voltage not BIL

The WG discussed the fact that the clearances in the proposed table are smaller than those contained in IEC 60076-3 and CSA-CAN C88-M90. This was shown graphically and in tabular form. Paul Jarman confirmed that the IEC values are conservative and to be used if the User does provide any values.

The WG discussed how the NEMA TR-1 clearances were matched with BILs. The highest BIL listed for each voltage in C57.12.00 Tables 4 & 5 was matched with the phase-to-phase clearance listed for each voltage in C57.12.00, Table 11. This is consistent with the C57.12.00-1993, the first reference the Chair could find to external clearances in C57.12.00 which lists BILs by voltage in Table 3 and external phase-to-phase clearances in Table 11. In addition, the proposed BILs and clearances are consistent with the NESC BILs and associated values. These NESC values have not changed since the 1930’s.

Several people felt that for a given voltage, the clearances for the lower BIL values are insufficient. They suggested that a single clearance be provided for each voltage. They suggested the clearances be established using the following method.

* Establish the clearance based on an equivalent BIL based on the voltage.
* The equivalent BIL = Voltage \* 1.8 (induced one minute value) \* 2.5

It was pointed out that the existing standard contains text stating that larger clearances may be required for testing and that the WG had previously agreed to follow the same approach.

“Factory dielectric test conditions may require larger clearances than those defined here.”

After much discussion, a straw poll was taken on this issue. Of those in attendance, 19 people felt the proposed values and methodology was appropriate, 6 people felt the revised method should be used and the balance of the attendees abstained from voting. Based on this straw poll, the WG is moving forward with the values contained in the survey.

The WG briefly reviewed the switching surge phase-to-ground and phase-to-phase clearances. Background information on how these values were established will be included with a survey on the proposed values.

The WG is looking for a new Secretary. After the meeting Troy Tanaka volunteered to fill this position.

Meeting adjourned at 10:45 am

Respectfully submitted, Eric Davis

**12.2.4.2**  **WG on Dielectric Frequency Response (DFR) – Ali Naderian, Chair; Poorvi Patel, Secretary. Monday, October 21st, 2013 – (3:15 -4:30PM)**

The meeting was called to order by the chair at 3:15 PM. This was the first Working group meeting. There were a total of 82 attendees; 30 requested membership and 52 requested to be guests.

1. Introduction of members and guests
2. The minutes of meeting from the Task Force Spring 2013 meeting in Munich Germany could not be approved since there was no quorum.
3. The Table of content for the DFR Guide was discussed.

In definition section – we should define the DFR methodology to be included in the guide

Add a section in 3. DFR measurements overview – that describes 50/60 Hz Power factor versus DFR (comparison, statistics…)

In section 6- Measurement analysis, interpretation, and report- Add moisture prediction uncertainties

Annex D- include examples of measuring issues in the field

Proposed List of Contents:

1. Overview

1.1 Scope

1.2 Purpose

2. Definitions

3. DFR measurement overview

3.0 DFR Test (frequency domain)

3.1 Use of DFR (DFR vs. tan Δ)

3.2 DFR Moisture Application

3.3 Recommended DFR measurement test parameters

4. Making a DFR measurement

4.1 Test procedures

4.2 Test environment preparation

4.3 Test object preparation

4.4 Test connections

4.5 Test Specification

4.6 Test leads

4.7 Measurement methods

5. Test records

6. Measurement analysis, interpretation, and report

6.1 Moisture estimation

6.1.1 Introduction

6.1.2 Modeling

6.1.3 Factors influencing moisture estimate

6.1.4 Report

6.2 Examples

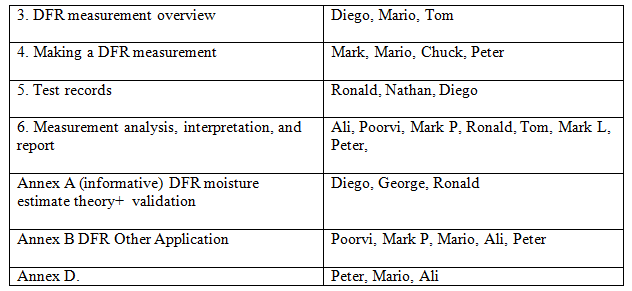
Annex A (informative) DFR moisture estimate theory + validation

Annex B DFR Other Application

Annex C: Examples of typical issues with the field measurement in the field (shorting is not an option, high noise interference,)

Annex D (informative) Bibliography,

7. Volunteers for the different section are mentioned in the Table below



1. Deadline for 1st draft of section 3 to 6 +Annexes :January 22nd 2014
2. Tentative schedule for conference call to review drafts: Feb 11 2014 or Feb 12 2014
3. Section leader will be appointed by the WG Chair and emails will be distributed to the volunteers for the different sections.
4. WG Chair will also distribute the DFR TF report.
5. Meeting was adjourned at 4.30 pm by Poorvi Patel and Mario Locarno

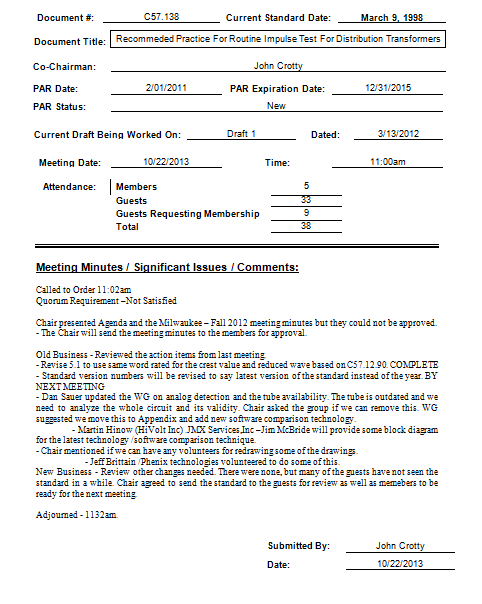
Ali Naderian, Chair

Poorvi Patel, Secretary

**12.2.4.3 Working Group for Revision of the Distribution Impulse Test Guide C57.138,**

**Recommended Practice for Routine Impulse Test of Distribution Transformers;**

**John Crotty, Chair**



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

The WG met on October 22, 2013, from 4:45 pm to 6:00 pm. Twenty-one (21) members and fifty-seven (57) guests attended the meeting. Ten (10) guests requested membership. The meeting was chaired by Pierre Riffon, chair of the WG. The co-chair was Peter Heinzig.

Required quorum was met; presence of 21 members was required.

Revision 1 of the agenda has been reviewed and approved unanimously as written. Motion for the agenda was made by Mr. B. Poulin and seconded by Mr. Paul Jarman.

Minutes of the Munich meeting were approved unanimously as written. Motion for Munich minutes approval was made by Mr. Joe Melanson and seconded by Mr. David Wallace.

The first item of business was related to the survey made within the WG and the Dielectric Tests SC on a proposal defining a non-mandatory order for impulse tests. As also defined by IEC 60076-3, the proposal suggests to perform the switching impulse test after the lightning impulse test. Comments received were discussed. Even if the approval rate within the WG and Dielectric SC was close to 89%, and after a long discussion, a modified proposal has been agreed upon in order to satisfy some of the negatives received. This revised proposal will be tentatively discussed during the Dielectric SC meeting as a new business or, if not possible, surveyed within the SC before the next meeting.

The motion of accepting the surveyed proposal was made by Joe Melanson and seconded by Vinay Mehrotra. An amendment to the initial proposal was proposed by Paul Jarman and seconded by Joe Melanson. The amendment was voted 19 in favor, 0 against and 2 abstain. The amended proposal was voted 20 in favor, 1 against and 0 abstain. The need to circulate the modified proposal at the Dielectric Subcommittee level was proposed by Loren Wagenaar and seconded by Joe Melanson. 19 members were in favor of the proposal, none against and 2 abstain.

As a new business, a request was made by Tom Lundquist to clarify the applicable tolerance on the front time during lightning impulse tests. The actual tolerance is ±30% on the specified value of 1.2 µs leading to an upper value of 1.56 µs. Nevertheless, for cases where the winding capacitance is high, an upper limit of 2.5 µs an even higher is also given but the rules defining acceptance of an higher value than the prescribed 1.56 µs are not clear. The text shall be clarified. Paul Jarman presented what has been agreed upon in the new edition of IEC 60076-3. A proposal based on the IEC wording will be surveyed within the WG membership before the next meeting.

As a new business, Peter Heinzig is resigning as the vice-chair of the WG and will be replaced by Mr. Martin Hinow from HighVolt.

The next meeting is planned to be held in Savannah, Georgia, on March 25, 2014.

The meeting adjourned at 5:50 pm on October 22, 2013.

Pierre Riffon P. Eng. WG Chair

October 22, 2013

## 12.2.4.5 Working Group on Revision of Low Frequency Tests; Bertrand Poulin, Chair; Bill Griesacker, Secretary St. Louis, MO – October 22, 2013

# There were 71 attendees, 22 members and 49 guests present at the meeting; 7 guests requested membership. More than 50 % of the working group members were in attendance at the meeting, therefore a quorum was present at the meeting.

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

# A motion was made by the chairman to approve the minutes from the Spring 2013 meeting in Munich, Germany. The minutes were approved unanimously.

# TF - PD in Bushings and Instrument Transformers:

# Nearly completed is the guide material on bushings. In one month will send this section of guide out for comments to members of the task force. Next meeting will focus on completing CT and PT sections of the guide. With the PAR on PC57.160 approved, the status of the TF has been changed to WG and will report directly to the DiSC in the future. Thang Hochanh will continue to lead the technical part of the work and the official WG chairman will be Bertrand Poulin who will take care of the administrative part of the work.

1. Tap Changer Position During Induced Test
   1. Results of Survey: Broad approval was received, 264 out of 410 responded, Approval without comments was 214 or 85 %. Approve with comments was 25 so total approval was about 95 %. There were 12 disapprove votes or 4.8%. Three objections came from manufacturers who claimed not to be in position to test transformers with preventative auto due to insufficient generator capacity. Another objection came from those with design of PA that uses an equalizing winding. After clarification, the member agreed to change his vote. One voter objected to test with a voltage exceeding the required terminal voltage only to test an auxiliary device. May suggest multiple tests to meet new requirement. A voter objected since the proposal may conflict with table 5.
   2. There were no comments that disagreed with the general concept that was proposed. Comments referred to improve the proposed wording.
   3. A second survey will be prepared and re-circulated in the next few months to those that have responded so far.
2. Old Business – none.
3. New Business – Section 10.5 for low frequency tests on transformers that have an internally grounded neutral. The question regarded the reason to the factor 3.46 at induced test on such transformers and why this applies only to single phase transformers. Chairman will search for an answer from people in distribution transformers.
4. The meeting adjourned at 2:21 p.m.

**12.2.4.6 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**

## Meeting Attendance

The working group met for the first time on October 21st 2013 at 11am. 43 persons were in the room. A total of 20 persons will be recorded as members. 23 will be listed as guests.

## Discussions

The title of the guide, scope, purpose and table of content were discussed. It was agreed that some of the sentences of the scope were informal and should be either removed or moved in a section of the document. The references to “Oil-Immersed” will be removed to allow documentation on other liquid immersed or even dry-type transformers.

The discussions led to a potential source of confusion regarding the permanent monitoring versus temporary monitoring. Phrasing of the purpose will be changed and sections of the guide could later be adjusted to bring precisions on these applications.

Adjustments to the Title, Scope and Purpose of the guide will be made and presented at the S14 meeting.

The guide revision planning was also presented. The schedule indicates that a request for PAR would be emitted after the spring 2014 meeting

## Adjournment

The meeting was adjourned at 12:10 PM.

David Larochelle – WG Secretary

**12.2.5 Liaison Reports**

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

The newly revised eighth edition of IEEE Standard 4, “High Voltage Testing Techniques” was published in May this year. There is a great deal of new material in this edition and also, new requirements that impact measuring techniques we use for making measurements during our transformer testing procedures. If there are members still not aware of these new requirements, the standard is now available for purchase; obtain a copy, check it out, do it now! Standard 4 is referenced in almost all the C57 testing standards and guides

There was a meeting of the HVTT working group earlier this year. The project having by then been completed, the meeting was short and sweat and focused on what future tasks the group might consider of interest. Several topics were suggested by the attending members, some of which were: revisions to IEEE 1122 pertaining to digital impulse recorders used for HV impulse measurements, revisions to IEEE 1223 pertaining to, requirements for impulse analysis software and, revisions to IEEE 510 pertaining to, safety in high voltage and high power testing. Other areas of interest were: a guide for HV tests and measurements in the field and, hardware and software requirements for instruments used for AC, DC and impulse measurements. The group will continue to correspond and future meetings will likely be arranged in conjunction with other IEEE apparatus committee meetings such as transformers, insulated conductors, switchgear and the PES general meetings.

Art Molden.

10/23/2013

**12.2.6 Old Business**

* + - 1. **Dielectric Tests-Task Force Ad Hoc Meeting To correct problems in Table 4 and 5 of**

**C57 12.00 Renaissance Grand Hotel, St. Louis, Missouri October 21st 2013**

**Ad Hoc Meeting Chair: Phil Hopkinson, Ad Hoc Meeting Secretary: Steve Griffith**

The Ad Hoc Task Force Meeting was called to order at 1:45 PM. There were 12 attendees: 11 members and 1 guest.

* 1. **Opening of the meeting.**

Mr. Hopkinson remarked that the purpose of this meeting was to correct problems with table 5 of the Dielectric Test Tables of C57.12 from 2010. He presented the tables as they are today and noted 3 issue areas: the column 12 and column 13 headers were incorrect, the one hour test level in the 500kV line was incorrect, and the enhanced test level in the 500kV line was incorrect. In addition he proposed suggestions for one of the table footnote #6 recognizing 500/525kV nominal and an additional footnote to account for higher neutral BIL Applied tests.

* 1. **Discussion**

Members present agreed to the following changes:

* Correct the column 12 and column 13 headers to read Grounded Y and Impedance Grounded Y
* Change the 460kV one hour test level to 475kV in the 500kV line
* Change the 520kV enhanced test level to 550kV in the 500kV line.

Members discussed the proposed suggestion to footnote#6 and decided to leave it as is.

In addition the following changes were agreed upon.

* In column 1 and column 2 under low-voltage windings change >=17 to 17, and <=15 to 15
* In column 6, the enhanced test levels under low-voltage windings reading from top to bottom will now be 26, 36, 48, and 72
* In column 7, the one hour test levels under low-voltage windings for the first two entries reading from top to bottom will now be 14, and 23
* In column 5, the impedance grounded Y applied test levels under-low voltage windings reading from top to bottom will now be 34, 34, 40, 50 and 70
* The heading low-voltage windings was renamed to state: low-voltage windings (below 69kV nominal)
* The heading high-voltage windings was renamed to state: high-voltage windings (nominal 69kV & higher)
* The last row under low-voltage windings (below 69kV nominal) was then moved under high-voltage windings (nominal 69kV & higher)

Members agreed that Table 4 also needed the same type of corrections. Members agreed that the table needed no provisions at this time for neutral BIL levels above 350kV. Instead they agreed to add a new footnote #7 to the table that states: Applied Voltage test level shall be specified by user.

* 1. **Next Steps**

It was mentioned that these proposed corrections would be presented in Dielectric Tests SC meeting on Wednesday.

* 1. **Adjournment**

The meeting was adjourned @ 3:00PM

Reported by: Steve Griffith, October 22nd, 2013

Accepted by: Phil Hopkinson, October 23, 2013

**12.2.7 Discussions on Dielectric Test Tables 4 and 5 C57.12.00**

There was a discussion on how to make proposed correction to table 4 and 5 - whether to accomplish this through a core agenda or wait for next revision. Some of the members requested time to review the corrected dielectric table. Motion was proposed and seconded to have correction to table approved by SC before making changes to standard.

Since correction to dielectric table was also impacted by changes to definition, Bertrand Poulin requested chair to read new definition of class I, which was presented by Michael Franchek, Chair. There was a request to have clarity on definition with respect to rating whether MVA is based on Max Name plate or base, which was clarified as Max rating.

An amendment to original motion proposed by Sauer Daniel and seconded by Tom Melle was unanimously approved to **“have a survey conducted within members of Dielectric Sub-committee on:**

**1) Proposed corrections to Table 4 and 5 of C57.12.00-2010**

**2)   Proposed change of definition for class I and class II transformers**

**and make recommendation to Transformer Committee for revision of C57.12.00.**

**12.2.8 New Business**

No new Business was brought for discussion.

**12.2.9 Meeting adjourned 12.20 PM.**

Minutesrespectfully submitted by:

Ajith M. Varghese

Secretary DTSC.

*Revision History*

*R2 : Minutes sent to DTSC member by email Ajith M Varghese 3/02/2014*

*R3 : Correction for Chair/Vice-chair name in Section 12.2.4.6. Ajith M. Varghese 3/20/2014*