

7.6 POWER TRANSFORMERS – JOE WATSON, CHAIRMAN

The Power Transformers Subcommittee met on Wednesday, October 24th, 2012 at 1:30 p.m. with sufficient attendance to reach a quorum.

The minutes from the Spring 2012 meeting in Nashville, Tennessee were approved.

7.6.1 WORKING GROUP AND TASK FORCE REPORTS

7.6.1.1 TASK FORCE FOR CORRIGENDA FOR C57.12.10 PARAGRAPH 5.1.9 – Gary Hoffman

The task force formed received 100 % approval for the change. The new document was submitted to RevCom for approval at the December 4th meeting.

7.6.1.2 WORKING GROUP FOR REVISION OF C57.17, REQUIREMENTS FOR ARC FURNACE TRANSFORMERS – Robert Ganser, Chairman

Draft 5 has been approved and the standard has been submitted to RevCom. Review is set for the 4th of December.

7.6.1.3 WORKING GROUP FOR REVISION OF C57.93, IEEE GUIDE FOR INSTALLATION AND MAINTENANCE OF LIQUID-IMMERSED POWER TRANSFORMERS – Mike Lau, Chairman

Chair Mike Lau called the WG meeting to order at 11:19 am on March 12, 2012. There were 45 attendees in the meeting with 15 attendees requesting membership.

The Chair outlined the meeting agenda and then updated on the PAR request submittal and approval status. The meeting discussion opened with the sections that needed to be revised. Mike Lau updated the forum that since transportation guide is well established the paragraphs on transportation will be removed. Title currently says IEEE Guide for Installation of Liquid Immersed Power Transformers and the discussion whether this needs to be updated to include Ester and all other fluids. So should liquid be replaced with fluid? Patrick McShane has worked on terminology and so he needs to be contacted for clarification on Fluid/ liquid. Tom Lundquist informed that ASTM has or is in the process of changing all terminologies from oil to liquid and the revision to C57.93 should include all fluids commonly used.

Scope currently does not include testing. Should testing be included or does it come in the purview of maintenance? Should Class I and II classifications be included? Attendees felt that it was too early to follow on such pattern. Besides

opinion were expressed that classifications based on voltages only should not be followed.

Drying Method – following were suggested:

- Hot oil circulation
- Pump hot air for tanks that cannot withstand vacuum
- Low Frequency method (an option)
- On Line systems
- Hot oil spray
- Impedance

Drying method should make reference to C57.140- Life Extension of Transformers.

Safety

- Inspection of transformers
- Oil processing
- Handling

Opinions were made whether air flow required inside transformer prior to entry in the tank for inspection should be made. This was largely felt that it would become a liability issue since come under regulatory bodies which could be either State or Federal Government rules. Bill Bartley and Tom Lundquist both were emphatic that this was not in the best interest of IEEE and so the discussion came to an end.

There being no new issues, the meeting was adjourned at 12:37 PM.

7.6.1.4 WORKING GROUP FOR REVISION OF PC57.116, GUIDE FOR TRANSFORMERS DIRECTLY CONNECTED TO GENERATORS – Gary Hoffman, Chairman

1. Roster & Membership

Members – 19 of 24 in attendance.

Guests – 39

Guests requesting membership – 2

Total attendance – 56

2. Attendance taken of Members & quorum was achieved.

3. Agenda for the meeting was approved.

4. Minutes of Nashville Meeting Were Approved.

3. Draft D1.31 Review & Recommendation

a. Clause 6 – Motion to Approve by Mark Baldwin, second by Peter Balma was approved

b. Clause 11 – Motion to Approve by David Harris, second by Richard vonGemengen was approved

4. Next Steps were discussed. Motion was made by Wallace Binder seconded by Dave Harris to initiate a straw ballot of the next draft D1.4. An amendment to the motion was made by Jin Sim to circulate the straw ballot to the PT SC Members. Mr Binder withdrew his motion and Mr. Sim's motion was seconded by Joe Watson. The motion carried 13 for, 2 against, 4 abstain.

At the conclusion of the Milwaukee meeting the Chair will initiate the Straw Ballot of Draft 1.4 to PT SC Members. The Chair indicated that the SA Sponsor Ballot spreadsheet will be used by straw balloters to make comments.

5. New Business – None

6. Motion Approved by unanimous consent to Adjourn at 5:12 PM

7.6.1.5 WORKING GROUP FOR REVISION OF PC57.125, GUIDE FOR FAILURE INVESTIGATION, DOCUMENTATION, ANALYSIS AND REPORTING FOR POWER TRANSFORMERS AND SHUNT REACTORS – Wally Binder, Chairman

Quorum was established - 28 working group members were present.

2. Minutes were approved for the Spring 2012 meeting.
3. Chairman's Remarks – (Wallace Binder)
 - a) Discussed membership requirements.
 - b) Discussed and presented updated schedule and discussed key dates of the schedule.
4. Motion by John Roach & 2nd by Bill Bartley was passed to form a Task Force to review and make recommendations concerning the incorporation of C57.117 into C57.125.
5. Motion by Tom Melle & 2nd by Bruce Farris was passed to form a Task Force for new work concerning C57.125.
6. CIGRE Coordination Activities – (John Roach) It was determined Christoph Kuen, is no longer the convenor of A.2.45. Marie-Claude Lessard is the new conveyor of A.2.45. WG will contact Ms. Lessard to determine if there is an interest in working together. In addition, Mr. Raj Ahuja will be contacted to determine a point of contact for the summary of CIGRE A.2.37 survey results.
7. TF Report on merger of C57.117 – (John Roach)
Work to Date – Original C57-117 has been updated and the incorporation location into C57.125 D2 has been proposed. Draft 2 is located on the WG's webpage. Changes include revised formatting, updated figure 1-form1, the addition of a table to clarify terms used in figure 1-form 1, and updated references and definitions to eliminate duplications with C57.125.
8. Motion by John Roach and 2nd by Tom Melle was passed to insert material from C57.117 into C57.125
as clause 7 in C57.125 D2.

9. TF Report on New Work – (Tom Melle)
Work to Date – TF has reviewed current C57.125 document and did not find many items which will require modifications, deletions, or additions.
10. New topics discussed:
 - a) The establishment of a database of transformer related failures. Mr. Mark Rivers volunteered to assist with the database discussion. The attendees were informally surveyed to determine user interest and several users responded they would support the database with failure information. Mr. Rivers agreed to make the database public.
 - b) The use of the term “insulating liquid” was discussed to replace the various similar terms used throughout the current document. A survey will be sent to the working group members requesting they review the document and comment.
 - c) A survey will be sent to the working group members requesting they review the updated references and definitions and comment.
11. Meeting was adjourned.

7.6.1.6 WORKING GROUP FOR REVISION OF C57.135, GUIDE FOR THE APPLICATION, SPECIFICATION AND TESTING OF PHASE-SHIFTING TRANSFORMERS – Jin Sim, Chairman

The WG met from 11:00 AM to 12:15 PM in the Mitchell meeting room at the Hilton Milwaukee City Center Hotel.

Welcome announcements were made. Introductions of all in attendance were done.

Since this is the first meeting of the working group, there are no members. A sign up sheet was circulated, and those requesting membership were automatically accepted and added to the roster. 52 people in attendance; 24 requested membership. See the last page for list.

The Chair presented slides. The file is available on www.transformerscommittee.org website, on the Power Transformers Subcommittee page there is a section for this Working Group. Following are some highlights of the presentation:

Introduction & Update on WG formation

- IEC approved the New Work Item Proposal 14/725 for dual logo standard on "Liquid Immersed Phase Shifting Transformers"

- IEEE also approved the PAR 60076-57-1202 for developing the New standard on “Standard Requirements for Liquid immersed Phase Shifting Transformers” in June 2012 and appointed Raj Ahuja as the Working Group Convener for IEEE and IEC meetings
- Steve Antosz has been appointed as the Secretary for IEEE WG
- Dr. Dietrich Bonmann has been appointed as the Co-Chair for IEC WG meetings
- Paul Jarman has been appointed as the Secretary for IEC WG (and Vice-Chair for the IEEE WG).
- Sanjay Patel has been nominated as the US Expert for the IEC WG
- Reference Document – IEEE Guide for the Application, Specification and Testing of Phase Shifting Transformers C57.135 which has been adapted as IEC 62032 document
- Request for participation in WG
- IEEE and IEC remain committed to working together to create international standards. Joint development agreement is a big step forward
- Cooperation between committees is key
- Target Dates
 - 1st CD March 31st 2014
 - CDV October 2014
 - IS/TS March 31st 2015, 1 Year Extension possible if needed
 - PAR Expires 12/31/2016
- Meeting Schedule:
 - 1st meeting on Oct 23rd 2012 at Milwaukee USA
 - 2nd meeting in Jan 30th - 31st 2013, at London
 - 3rd Meeting in March 2013, at Munich on Thursday A/N
 - 4th meeting in June 2013, TBD – Finalize 1st WG Draft
 - 5th meeting in Oct 2013, at Milwaukee during IEC TC 14
 - 6th meeting in Oct 2013, at St Louis USA, during IEEE
 - 7th meeting in Jan 2014 TBD
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Some discussions ensued. Here are the highlights.

- We will use the new IEEE Central Desktop to manage this WG from the IEEE side. And will use the IEEE AMS system to keep track of members and rosters.
- We have 5 documents to use as the starting point and format for the new Standard; C57.12.00, C57.12.90, C57.135, 60076-5-1, 60076-5-3. These documents will be put on our website, with password protection, for use of the members to work on the new Standard.
- One comment was that it will be a challenge to manage the ballots and avoid negative votes from the IEEE side. IEEE staff will help us to monitor the process and keep the project moving forward.
- The WG Secretary will send an email to the Members (and Guests) in the next few weeks, seeking commitment from some to attend the next meeting in London at end of January. Will also send the meeting minutes, roster, and other

information needed to get started. Members will be asked to review the 5 reference documents and give comments on what they see as the issues that we will need to be addressed in the draft.

- Here are preliminary issues that some thought might be potential problems:
 - o Too many Normative references. It was suggested to put two sets of references, one for an IEC application, and the other for IEEE.
 - o Specification of the PST to increase or decrease current flow
 - o Test guidelines, particularly low frequency tests.
 - o Tap changers will not be covered in this document; they have separate standards.
 - o Figures, illustrations, drawings will need to be redrawn by IEC Staff. IEEE people typically use Visio.
- Jin Sim said he is encouraged by the good showing of people in the room and the content of this first IEEE WG meeting.

7.6.1.7 WORKING GROUP FOR THE REVISION OF PC57.140, GUIDE FOR EVALUATION AND RECONDITIONING OF LIQUID-IMMERSED POWER TRANSFORMERS – Roland James, Chairman

The meeting was called to order at 1:37 pm on October 23, 2012.

The Chair welcomed all, introduced himself followed by the Secretary and the attendees. Roll call of only the members was taken to verify if the group had a quorum. The Chair announced that a quorum was not present.

There were 19 members in the attendance and 7 corresponding members (downgraded after the spring 2012 meeting). In addition, there were 3 excused absences. There were 27 guests of which 3 requested membership.

There were no comments on the minutes of the spring 2012 meeting. These minutes will be transmitted along with the fall 2012 minutes to the working group prior to the spring 2013 meeting.

Ajith Varghese, chair of the Task Force for the review of the CIGRE WG A2.34 Guide for Transformer Maintenance for incorporation into this Guide recommended that this guide be added as a reference to this guide.

Due to a lack of a quorum a straw vote was not taken. A straw vote ballot will be circulated the working group voting members and the results will be provided to the working group prior to the spring 2013 meeting.

The floor was opened for discussion. There was none.

There being no new business, the meeting adjourned at 1:55 P.M.

7.6.1.8 WORKING GROUP FOR DEVELOPMENT OF PC57.143, GUIDE FOR APPLICATION OF MONITORING TO LIQUID IMMERSSED TRANSFORMERS AND COMPONENTS – Donald Chu and Andre Lux, Co-Chairmen

No meeting this week. The document went to RevCom in August, sections discussing cost evaluation were rejected, the approach was changed to a “per unit” evaluation. A recirculation ballot was conducted in September. All work is done on the Guide and it will go to RevCom for the December meeting.

7.6.1.9 WORKING GROUP FOR DEVELOPMENT OF PC57.150, GUIDE FOR THE TRANSPORTATION OF TRANSFORMERS AND REACTORS RATED 10,000 KVA OR LARGER –Greg Anderson, Chairman

No meeting held. Document was submitted to NesCom for approval, waiting on comments.

7.6.1.10 WORKING GROUP FOR DEVELOPMENT OF PC57.153, GUIDE FOR PARALLELING TRANSFORMERS – Tom Jauch, Chairman

43 total attendees

21 of 32 members were present (1 corresponding) – Quorum was established

22 Guests (11 new)

1 attendee requesting membership was attending their first meeting and will be added as a guest

- Introductions were skipped to save time
- Minutes from Nashville were reviewed and approved
 - o Gary Hoffman – Motion
 - o Jim Harlow – 2nd
 - o Motion carried
- Prior to the meeting, the latest draft of the paralleling guide was distributed to guests and members on record. Proposed changes were reviewed during the meeting. The following changes were discussed:
 - o Motion to revise the wording for the “Goal of Paralleling Control Method”
 - Hemchandra Shertukde – 1st
 - Jim Graham – 2nd
 - Motion carried
 - During the discussion, a motion was made to further revise the wording for the “Goal of Paralleling Control Method” to include the “The desirable goal”
 - Jim Harlow – 1st

- Gary Hoffman – 2nd
 - No – 3, Abstain – 1, Yes - 11
 - Final wording – “A desirable goal of all transformer paralleling control systems is to minimize the loading difference (circulating current) between paralleled transformers relative....”
 - o Section 4.4 – Motion to accept the proposed change in 4.4.
 - 1st - Daniel Sauer
 - 2nd – Hemchandra Shertukde
 - Discussion – Jim Harlow recommended adding the word apparent to the proposed change.
 - Additional discussion was held on whether the section was required at all.
 - Motion denied (No – 14, Yes – 3)
 - o Section 4.2, Page 9, line 35
 - Motion to add the wording in line 35
 - Motion denied (No – 10, Yes – 2)
 - o Page 11, line 31
 - Additional changes were discussed and agreed to by the group – run back relay
 - o Page 13, line 1
 - Comment was made that the references in the proposed addition are incorrect. Need to change the figure being referenced or remove the reference
 - o Page 14 – no change – motion denied previously
 - o Page 17 – no change – motion denied previously
 - o Page 19 - need to check the numbers quoted. Jim Harlow recommended referring to an IEEE transaction paper. Remove the @ signs.
 - o Page 22 – line 37 - agreed
 - o Page 23 Line 15 – agreed
 - o Page 27 – Recommended to refer to the reader to C57.12.10 rather than duplicating information in this guide
 - o Page 29 – line 7 – agreed
 - o Page 27 – 6.3.4 – remove – agreed
- The following members volunteered to assist with providing updates to the guide:
 - o Review and update sections 2 – Normative References and 3 – Definitions - . Normative – Hemchandra Shertukde
 - o Update the guide to meet the requirements of the 2012 style guide – Jim Graham
 - o Review and update drawings – Stephen Anthony

6pm motion to adjourn

- 1st – Daniel Sauer
- 2nd – Hemchandra Shertukde
- Motion carried

Following the working group meeting a task force meeting was held to report operational examples of different paralleling methods in separate source applications.

7.6.1.11 WORKING GROUP FOR DEVELOPMENT OF PC57.156, GUIDE FOR TRANSFORMER TANK RUPTURE MITIGATION OF LIQUID-IMMERSED POWER TRANSFORMERS AND REACTORS– Peter Zhao, Chairman

The meeting of the Working Group for the Guide for Tank Rupture Mitigation convened Monday afternoon at 1:45pm. Chairman Peter Zhao presided.

Attendance was 56 (16 members, 40 guests, with 1 guest requesting membership).

Minutes for the Spring 2012 meeting in Nashville were approved.

Chairman Zhao provided introductory remarks and previewed the agenda to be covered for the meeting.

- The basic schedule for completion of the guide was reviewed. A first draft must be sent out by the fall of 2013. Therefore we have basically two more meetings to get it done.
- Attendees were informed that the latest draft of the guide is posted on the IEEE website.

Samuel Brodeur of ABB presented a report of his investigation of data for oil velocities relating to PRD's. Sam recommended that manufacturers be requested to generate and provide to the WG data for oil velocity data as relating to PRD's. A discussion ensued of the need for involvement of a PDR manufacturer. Josh Herz agreed to collaborate with Sam. They will bring results to the next meeting.

Discussions continued from the last meeting regarding the comments received from the review of the guide:

1. Comments in regard to excessive demands on manufacturer for the design review and test requirements lacked specificity. Jos Veens agreed to have reviewers reconsider and provide updated comments.

2. Matthew Brien and Arnaldo Carlos are to review sections (6.3- Design Manual, 6.4- Operation and Instruction Manual, 6.5- Proposed Information Requirements and 7- Acceptance Evaluation) and report findings.
3. Value of illustrations of example physical design modifications was discussed and consensus was that including such detail might be problematic.
4. Question of applicability of a check valve for conservator pipe was resolved by reference to a “flow-rate-dependent” check valve

Meeting was adjourned at 3:00 PM.

7.6.1.12 WORKING GROUP FOR DEVELOPMENT OF PC57.157, GUIDE FOR CONDUCTING FUNCTIONAL LIFE TESTS FOR DE-ENERGIZED TAP CHANGER CONTACTS – Phil Hopkinson, Chairman

The Working Group on Life Tests, De-energized Tap Changers was called to order at 8:00 AM on October 23rd, 2012.

A. Introductions

The chairman welcomed attendees and introduced the new secretary. After a count of the members present it was determined that a quorum was not present. There was some discussion concerning active members. A comment was made from a member that if person missed 2 to 3 consecutive meetings they should be removed as an active member. It was determined that the roster needed to be adjusted to remove active members that have missed consecutive meetings. A comment was made that the total number of members should be around 20. It was decided for the purposes of this meeting that a quorum was present.

B. The minutes were approved from the March 13th, 2012 meeting in Nashville, Tennessee

C. Mr. Dix conducted a review of the following sections on Draft 3 of the Guide for Conducting Functional Life Tests for De-Energized Tap-changer Contacts used in Dielectric Fluid Filled Transformers

The accelerated aging text in Section 4.4 was reviewed.

Section 4.5-Application of Specific Switch Characteristics to test- there were no comments from the group.

Section 5- General Test Setup

Section 5.1- Safety Considerations- there were no comments from the group

Section 5.2.1- Items for test-switch components- there were no comments from the group.

Section 5.2.2- Items for test-fluids- a comment was made that Synthetic Esters needed to be included in the last sentence.

Section 5.2.3- Items for test-fluid containment chamber- a comment was made that fluid should be used versus oil in the last sentence

Section 5.3.1- Monitoring locations-switch components- there were no comments from the group. Subsection 5.3.1.1-temperature- a comment was made to spell out all acronyms. Subsection 5.3.1.2-voltage- there were no comments from the group. Subsection 5.3.1.3-current-there were no comments from the group

Section 5.3.2- Monitoring locations-fluid, a comment was made concerning placement of the probe. There are other IEC/IEEE standards that call out placing it greater than 1" of contact pair under test. There was a brief technical discussion concerning this, it was agreed to leave the text as is.

Section 6- Test procedure- a comment was made that the ambient fluid surrounding the contacts should be at a temperature not greater than 30 degrees C (versus 20 degrees C) at the time the test begins.

Section 7- Test data recording- a comment was made that it should be shown in the definitions section of the document where the formula came from.

Section 8- Pass/Fail Criteria- a question was raised if the 25% increase from base resistance is acceptable as a pass criteria. A proposal was put forward to revise this to a table form that indicates pass criteria depending on the type of the contact. This proposal was accepted.

A comment was brought up from the chairman as to whether this guide will include diagrams/and photographs. It was stated that since this is a black and white guide it will only include diagrams once the verbiage has been agreed upon.

A comment was brought up from a member that this guide needs to be consistent it terminology throughout the document.

The chairman noted Larry Dix should be applauded for the work presented thus far on this guide.

D. New Business - There was no new business

E. Adjournment

The meeting was adjourned at 9:20AM

7.6.1.13 WORKING GROUP FOR REVISION OF IEEE STD 638-1992, IEEE STANDARD FOR QUALIFICATION OF CLASS 1E TRANSFORMERS FOR NUCLEAR POWER GENERATING STATIONS – Craig Swinderman, Chairman

The Working Group for revision of IEEE 638 did not meet during the Milwaukee session in October 2012.

Draft 9 of the document has just completed the initial round of balloting. Out of 87 balloters, a 79% response rate was achieved, with 94% Affirmative rate and 2% Abstain rate. 56 comments were received, including 4 Negatives.

The working group is now actively involved in comment resolution and the document will be submitted for the recirculation ballot shortly.

A PAR Extension request has been submitted to NESCOM for the Standards Board December agenda, in order to allow time for the comment resolution process and recirculation ballot in order to complete the work for submitting the standard.

7.6.1.14 WORKING GROUP FOR DRAFTING IEEE/IEC 60076-57-1202, STANDARD REQUIREMENTS FOR PHASE SHIFTING TRANSFORMERS – Raj Ahuja, Chairman

The WG met from 11:00 AM to 12:15 PM in the Mitchell meeting room at the Hilton Milwaukee City Center Hotel.

Welcome announcements were made. Introductions of all in attendance were done.

Since this is the first meeting of the working group, there are no members. A sign up sheet was circulated, and those requesting membership were automatically accepted and added to the roster. 52 people in attendance; 24 requested membership. See the last page for list.

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 - o Tap changers will not be covered in this document; they have separate standards.
 - o Figures, illustrations, drawings will need to be redrawn by IEC Staff. IEEE people typically use Visio.
- Jin Sim said he is encouraged by the good showing of people in the room and the content of this first IEEE WG meeting.

7.6.2 OLD BUSINESS

None.

7.6.3 NEW BUSINESS

None.

7.6.4 STATUS OF “INACTIVE” GROUPS

WORKING GROUP FOR THE REVISION OF C57.93, INSTALLATION OF LIQUID-FILLED TRANSFORMERS - Michael Lau, Chairman

This group is not meeting; major work on this document is complete; waiting for publishing.

TASK FORCE FOR WIND FARM TRANSFORMERS – Joe Watson, Chairman

Work of this group is complete; the task force is inactive.

TASK FORCE FOR EVALUATING THE NEEDS OF TRANSFORMERS USED WITH SVC – Peter Zhao, Chairman

Fall 2009 - The work of this task force is concluded. A report was issued and it is being considered if an educational paper should be published.

TASK FORCE FOR WIND GENERATOR STEP-UP TRANSFORMERS – David Buckmaster, Chairman

This task force was moved to Performance Characteristics Subcommittee.

WORKING GROUP FOR REVISION OF C57.12.10, STANDARD REQUIREMENTS FOR LIQUID IMMERSED POWER TRANSFORMERS – Gary Hoffman, Chairman

The standard was published.

WORKING GROUP FOR REVISION OF C57.135, GUIDE FOR THE APPLICATION, SPECIFICATION AND TESTING OF PHASE-SHIFTING TRANSFORMERS – Jin Sim, Chairman

The working group completed its work and the guide was published in 2011.

TASK FORCE FOR DVP-GRID TRANSFORMERS PC57.169, – Hemchandra Shertukde, Chairman

This task force was moved to Performance Characteristics subcommittee.