

Insulation Life Subcommittee - Unapproved Meeting Minutes
November 2, 2011 – Boston, MA

10.3 Insulation Life Subcommittee – Bruce Forsyth, Chairman

The Insulation Life Subcommittee met in Boston on November 2, 2011 at 8:00 AM.

The minutes of our meeting in San Diego, CA meeting on April 13, 2011 were approved as written.

A roll call of the members revealed that a quorum was present. The attendance rosters show that the meeting was attended by 164 people, 47 of 74 members and 117 guests. 21 guests requested membership.

10.3.1 Chair's Report

The Spring 2012 IEEE Transformers Committee Meeting will be held in Nashville, TN on 3/11-3/15. The Fall 2012 meeting will be held in Milwaukee, WI in October. The Spring 2013 meeting will be held in Munich, Germany on 3/17-3/21.

A new meeting format will be introduced at the next meeting. The main meeting will be held on Monday morning. The Monday and Tuesday evening tutorials will be moved to Thursday morning. A “wrap-up” meeting will be held on Thursday after the tutorials.

10.3.2 Project Status Reports

10.3.2.1 C57.91 Loading Guide

C57.91 ballot was completed and the document was submitted to the Standards Board for approval.

10.3.2.2 C57.100 Thermal Evaluation Guide

C57.100 ballot was completed and the document was submitted to the Standards Board for approval.

10.3.2.3 1538 Guide for the Determination of Maximum Winding Temperature Rise in Liquid Filled Transformer

1538 was reaffirmed and the document was submitted to the Standards Board for approval. Some concern has been expressed that this document is out of date.

10.3.2.4 1276 Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Transformers

A PAR has been submitted for 1276.

10.3.3 Working Group and Task Force Reports

10.3.3.1 Working Group for the Revision to C57.91 Loading Guide – Don Duckett

The working group was called to order by Chair Don Duckett at 9:35am. Vice Chair Carlo Arpino and Secretary Susan McNelly were also present.

There were 25 of 55 members present (a quorum was not achieved) and 51 guests. New requests for membership will not be entertained due to the Guide having gone to ballot.

Agenda:

- 1. Member Roll Call/Introductions**
- 2. Previous meeting minutes approval**
- 3. Status of the present Guide**
- 4. Adjournment**

Introductions of members and guests were made.

Minutes from the Spring 2011 meeting in San Diego, California were not approved.

Status of the present Loading Guide:

C57.91 D10 of the Guide has been submitted to REVCOM and is on the agenda for the December 2011 meeting.

NEXT STEPS:

What is the future work for this WG?

1. Review of comments and past work not addressed due to time limitations.

Jin Sim brought up the issue of condition based loading. If the transformer is in good condition it will have different loading factors than a transformer that is not in good condition.

2. References to recent papers and new and updated work.

3. “Liquid-filled” vs “Mineral Oil-Filled” – New insulation systems

Sue McNelly commented that at the ADCOM meeting this had been discussed and the thought at that time was that trying to incorporate other fluids into the Guide would make it too long and unwieldy. This will need further discussion.

4. Annex G vs Clause 7 issues.

Jin Sim wants to make sure that we do not redo what we have already done.

5. Setting user ratings to support NERC/FERC guidelines – Expand/rework Annex C?

C57.119 has recommended practices to determine m and n constants.

6. Recommended data and formats for data needed on future manufacture test reports.

Don Duckett indicated that obtaining this data is often difficult to get from the user. Most of the time only nameplate information is available.

7. Seasonal environment/Ambient and load data collection

Don indicated that this information is very spotty as well. Jin Sim indicated that much of this information should be available.

8. Work between now and Nashville?

Bruce Forsyth Chair of the Insulation Life SC indicated that the scope of the WG has been met. The WG assignment has been met and it should now go to the SC for determination on whether there is need to reopen for future revision or to go in other directions. There may be other priorities that require further work. Therefore, this will be the last meeting of this WG.

Additional comments:

There was considerable discussion on the topic of GIC events.

Ramsis Girgis brought up the issue of GIC. He indicated that you will have a cycling event of low levels for 20 or so minutes and a higher peak for 2 or 3 minutes. There can be overheating of the winding during these conditions. He asked what temperature limits should be allowed during these types of events. Would it be equivalent to emergency loading levels or something higher?

Don Platts asked that the loading guide has been developed as a tool to try and determine the temperatures. He indicated that there are no tools available to calculate the temperature for what Ramsis was asking.

Ramsis indicated that a capability curve has been developed to indicate how much load should be allowed during GIC events. There is typically close to an hour of notice of GIC events before they occur. The windings have a certain temperature at a certain load, therefore if the winding is at 100C under a certain load and you add the GIC current on top of that, what temperature should be allowed for this event.

Under the GIC event, the manufacture can calculate what the temperatures will be, but the question is what is acceptable. The GIC cycle is every 11 to 12 years and who will

experience it depends on the strength of the GIC event. Ramsis indicated that this is an urgent critical issue. What should be allowed for that peak temperature, is it 160C or 180C?

Hasse Nordman indicated that he would consider this to be covered by the loading guide as a short term emergency loading situation.

Jin Sim indicated that there are other sources of DC than just GIC events. He indicated that NEMA RI9 has traction duty type information. He indicated that he would not recommend 180C. He indicated his limit would be 140C. He indicated that this group cannot indicate an allowed temperature, it can make a recommendation and indicate what risks might be associated with loading to a recommended level.

Comment was made that GIC is not a Loading Guide issue as the GIC affects the core not the winding.

Ramsis is on the NERC committee and is looking for a yes or no answer for a report that needs to be submitted to NERC. A request was made of membership present as to whether use of 180C winding temperature would be acceptable (same as the short-term rating in the present guide) for the short 2 to 3 minute GIC peak currents. A straw poll was taken and the consensus (approx 35 to 1) was that this would be acceptable to use as a suggested loading curve.

The meeting was adjourned at 10:35 AM.

Respectfully Submitted

Don Duckett	Carlo Arpino	Susan McNelly
WG Chair	WG Vice Chair	WG Secretary

10.3.3.2 Working Group On Thermal Evaluation Of Power And Distribution Transformers (C57.100) – Roger Wicks

C57.100 was successfully re-circulated and submitted to the Standards Board for approval.

The process, time line and significant changes were reviewed. In addition, Roger Wicks thanked the Ballot Resolution Group consisting of Don Platts, Tom Prevost, John Luksich, Terry Drees and Jin Sim for their efforts.

10.3.3.3 Task Force on High Temperature Liquid-Immersed Transformers (PC54.154) – Richard Marek

The seventh meeting took place on Monday, October 31, 2011 in the Pacific FGH Meeting Room at 1:45 pm, at the Renaissance Waterfront Hotel, Boston, Mass. Introductions were made and attendance sheets were circulated. The Chair noted that two members were changed to guest status due to inactivity. They were notified by email and there was no response. A third member indicated that he would not be able to attend on a regular basis and

his status was changed to corresponding member. At 33 members, a quorum was established with 21 members and 44 guests present. The minutes from the San Diego meeting were approved as submitted.

Gary Hoffman was thanked for his extensive work reformatting the document from a guide to a standard. The members of two task forces were also thanked for completing their work since the last meeting. The first task force dealt with re-designing Figure 4. The second developed an informative annex summarizing the evidence supporting the thermal enhancement of kraft paper by ester liquid. Both were added to Draft 7, which was released for a joint survey of the Working Group and the Insulation Life Subcommittee in August.

The survey was disappointing however, with only 43 percent of the 98 responding and only 59 percent of the Working Group. This was after three reminder emails. 86 percent of the responses were affirmative and 18 submitted comments. Of the 90 or so comments, about half were editorial. Copies of the comments were sent to all members and guests before the meeting.

Most of the rest of the meeting was spent resolving these comments. The chair presented 63 major comments, grouped in order by page number with a suggested response for most. 24 of these comments were discussed in the meeting and most were accepted. A notable exception was a comment by Joe Foldi questioning the 110 and 130-degree temperature rise limits in Table 2. Bubbling in mineral oil was the concern and Jin Sim agreed. The Chair pointed out that these are the same limits taken from the 1997 version of IEEE Std 1276 and bubbling was addressed then. The Chair will provide specific references from this document, but the matter was left unresolved.

One recurrent comment concerned the meaning of the term temperature class. The Chair presented some background on how temperature classes are addressed in IEEE and IEC standards, including the dry-type standards, where multiple insulation system, temperature classes have always been the norm. In contrast, the concept is foreign to liquid-filled transformer standards, which do not reference temperature classes, since only two classes are commonly used. This lead to a proposal to reference the insulation system test procedures in C57.100 and to define how the results relate to a temperature class. The proposed table will show the relationship to the hottest spot temperature for each temperature class. The proposal also included the addition of an intermediate class of 140 as a way to resolve Working Group issues with tabulated temperature limits.

With a large number of unaddressed comments, Jin Sim suggested an intermediate teleconference discussion, since the goal was to ballot the document before the 2012 Spring meeting. A show of hands indicated support and the Chair agreed to issue Draft 8 with resolved changes and suggested all submit comments before the discussion.

The meeting adjourned at 3:05 pm.

10.3.3.4 Working Group for Temperature Rise Test Procedures Section 11 of C57.12.90 - Paulette Powell

The WG on Temperature Rise Test Procedures in Section 11 of C57.12.90 met in the Pacific D room of the Renaissance Boston Waterfront Hotel in Boston, MA at 11:00 AM.

Introductions of members and guests were made. The chair reviewed requirement for quorum and took count of the membership. There were 18 members and 60 guests. A quorum was established. The minutes of the April 12, 2011 meeting in San Diego were approved as written.

Projects:

After introductions, we proceed to discuss the first proposal concerning the clause 11.1, the loading back method for temperature rise test. The proposal was to make this method mandatory for transformers 1500 kVA 3-phase, 500 kVA 1-phase or lower. After some discussion the proposal was first changed from mandatory to preferred by Mr. Marcel Fortin, and finally an agreement was achieved, by the proposal by Mr. Mark Perkins, leaving the same wording as it is now in the standard, but changing the order of appearance of the methods. The loading back method will appear first as item 1), followed by the short circuit method as item 2).

The second clause to be reviewed was the 11.1.2.2 of the loading back method, that requires both transformers, supply and under test, to be identical. The proposal was to allow these transformers to be different, allowing the supply transformer to be equal or higher kVA, and up to 10% voltage different than the transformer under test. There was much discussion because the wording of the proposal was confusing. Finally it was proposed, by Mr. Bertrand Poulin, to perform a major change to the clause stating that what is really important is to provide proper voltage and current to the transformer under test, and the rated characteristics of the supply transformer are irrelevant, and have to be defined by the test area. A new proposal will be prepared, by Mr. Bertrand Poulin, and sent to the working group members for approval.

Old Business

The survey to the IL and DT subcommittees regarding sub-clauses 11.2.2 c, d and f will be presented at the next meeting.

New Business

There was no new business.

The Meeting was adjourned at 11:48 AM.

Respectfully submitted,

Juan Castellanos, Co-Chair
Marnie Roussell, Secretary

10.3.3.5 Task Force on Furan Testing – Shuzhen Xu

The meeting started at 9:30am and adjourned at around 10:45 am on Oct. 31st, 2011. There were 73 attendees with 16 furan task force members. The task force has 60 members so the meeting couldn't have a quorum.

The following activities were taken place during the task force meeting

- Introduction of members & guests
- Task force activities and status update & report

During the discussion of the position, the following suggestions were received from the audience:

- (a) Adding loading factor: <20%, 20%~75%, >75%, into the data collection list
 - (b) Add oil temperature into the data collection list
 - (c) Regarding transformer type, add “wind use” into the list
 - (d) Add “particle in oil” into the data collection list
 - (e) List “must have” items on the proposed data collection list.
- Open discussion on the following items:
 - (a) *Is there any need to collect furan data from field transformers for analysis?
If yes, how?*
 - (b) *Should the task force propose a working group to the subcommittee for developing a guide document on furan analysis?*

Since the meeting didn't have a quorum, we couldn't vote on whether the task force recommends the furan data collection. But the attendees were asked during the meeting to vote their opinion on whether data collection is necessary (29 attendees votes yes and one voted no). Also the consensus of attendees is having a working group to develop a guide on furan analysis.

10.3.3.6 Task Force on Temperature Rise of Non-current Carrying Metallic Parts – Jeff Ray

This Task Force has completed its work. Its recommendation was presented to the Subcommittee. See New Business.

10.3.3.7 Task Force on Moisture Estimation in Transformer Insulation – Jin Sim

The Task Force on Moisture Estimation in Transformer Insulation did not meet during the Spring 2011 Transformer's Committee meeting.

The TF anticipates having a draft of the paper by the end of the year. Once complete, the draft will be circulated in the TF for comment.

10.3.3.8 Task Force on Winding Temperature Indicators - Phil McClure

The results of this Task Force should be available soon.

10.3.4 Old Business:

No old business.

10.3.5 New Business:

The Task Force on Temperature Rise of Non-current Carrying Metallic Parts presented its recommendation. A motion was made to accept the recommendation of the Task Force. This motion was approved.

There was considerable discussion about Table 8. The following points were made.

- Are there any temperature limits for material in contact with air?
- The paper used as wrap on conductors is thermally upgraded. However, the pressboard used for spacers is not thermally upgraded. It was pointed out that this table applies to non-current carrying metallic parts so it would not apply to spacers.
- It is not effective to impose limits in a guide. This should be done in a standard.
- The table has been labeled correctly.
- The intent is to help users evaluate the risk of temperature in the transformer. Design calculations are provided in the loading guide.
- An objection was made to the wording as it does not include glass fiber.

10.3.6 The meeting adjourned at 9:15 AM.

Bruce Forsyth
Chair, Insulation Life Subcommittee