MINUTES - INSULATION LIFE SUBCOMMITTEE MEETING
8:00 AM Wednesday, October 23, 2002 Oklahoma City OK

9.7 Insulation Life Subcommittee - D.W. Platts

The Insulation Life Subcommittee met at 8:00 AM Wednesday, October 23, 2002 in Oklahoma City. Attendance was 26 members and 58 guests.
The minutes of the April 17, 2002 meeting in Vancouver BC were approved after correction of the last meeting location (It had been reported as Orlando, rather than Vancouver).

9.7.1 Chair's Report

9.7.1.1 ADCOM meeting on Sunday. Details of the discussions will be reviewed in the Main Committee meeting. There were no items that directly effected the work of this subcommittee.

Chairs of WGs and SCs need to establish Secretaries to their committees who can chair the meetings in the event that he or she can not attend for personal or professionally related reasons. This step is expected to avoid the problem canceling many meetings often at short notice.

Our next subcommittee meeting will be in Raleigh, NC on March 19, 2003.

9.7.2 Status Reports for active projects:

Subhash Tuli reported that ballots of C57.12.00 and C57.12.90 have been completed. They were successful, but there are several items to be resolved from the negatives and the comment. Some of them will be forwarded to our subcommittee for resolution.

The loading guide, C57.91, has been balloted for reaffirmation, along with a corrigendum covering several errors that had been found in the printed document. The ballot included an electronic version of the guide and it contains several errors produced during the scanning process. It must be revised to clean up those errors.
There were some negatives and Linden is working to get both of these documents ready for the Standards Board.

9.7.3 Working Group reports were as follows:

9.7.3.1 Working Group on Loading of Liquid Immersed Transformer - Linden Pierce, Chair.

The Working Group did not meet.

This working group meeting was cancelled after the schedule was published, and clearly demonstrates the need for additional involvement. The chair again asked for a volunteer to assist Linden with this working group.

Don Platts reiterated the need for this document to appropriately cover loading of distribution transformers and called for volunteers to contact him if they are interested in that topic. We will

work to develop a reasonable approach, rather than merely stating that the required test data is usually not available so therefore, the guide cannot be applied.

9.7.3.2 Working Group on Definition of Thermal Duplicate - Barry Beaster, Chair.

The Working Group did not meet. Barry has resolved the issues with the expired PAR. Their draft document was balloted, and it has recently closed.

9.7.3.3 Task Force on Winding Temperature Indicators - Phil McClure, Chair

The meeting convened at 1:55 PM following the luncheon, which ran long. Five members and twelve guests signed the attendance roster, though the mid meeting headcount was 23.

The minutes of the Spring 2002 meeting in Vancouver were approved.

Old business:

> During the meeting in Vancouver a call for volunteers was issued for authors to write sections on the Users' and Transformer Manufacturer's perspectives on winding temperature measurement. The response was good, and the four authors who contributed were recognized.
>
> The section on Transformer Manufacturer's perspective is still mostly incomplete, and a list of questions were provided in an effort to guide potential authors as to the type of information and structure required for the paper.
>
> The user section which deals with operation and ownership of WTI's is also incomplete, and a similar list of questions was provided to guide potential user-authors.

A brief discussion of the electrical environment section was conducted in order to establish whether users were specifying standards for EMI/RFI and surge immunity. Those attendees who had experience with the subject indicated that C37.90.1-1989 was their standard of choice.

A discussion of a new section dealing with thermal curve libraries was conducted. The intention of this section is to introduce the concept of establishment of a set of actual, carefully constructed thermal profiles, generated from heat runs from a variety of transformers, from which the response characteristics of calculating WTI's could be evaluated.

During the discussion it was stated that one of the original concerns which precipitated the formation of the task force was not yet answered by the paper. The concern was that, if a loss of cooling event occurred near, at, or above rated load, would the time constant of the WTI allow for prompt alarming?

It was explained that the question will be answered in the conclusions section as a compilation of the various sections which contain contributory factors. In summary, winding temperature indicators as a class operate on the assumption that all cooling auxiliaries are operating normally. The WTI will only respond to the inputs it has available. Assuming the load current and oil temperatures are those inputs and the load current has not changed, then the time constant will essentially be that of the oil. In addition, most calculating WTI's adjust the hottest spot gradient based on the number of cooling stages in operation. If the WTI has set its alarms to operate all

cooling auxiliaries and it cannot detect cooling failure it will "believe" that all cooling stages are operating properly and it will adjust the gradient downwards to the rated gradient.

New Business:

It was announced that the task force has been invited to conduct a panel session at the Spring 2003 meeting in Raleigh. We are honored to accept the invitation. The session will cover the major points of the paper from the three perspectives offered. Several prospective panelists were contacted prior to the meeting and they have offered to participate.

The meeting adjourned at 3:15 PM.

Respectfully Submitted,

Phil McClure
Chair

9.7.3.4 Task Force on Temperature Rise Clause 5 C57.12.00- Dennis Marlow, Chair

The Task Force met on Tuesday, October 22, 2002 at 11:00 AM. There were 15 members and 10 guests in attendance.

The minutes of the previous meeting were included in the Subcommittee minutes, and were approved. The Chair noted that the comment concerning rectifier transformers for proposal 2, although correct, would not be applicable to this proposal for C57.12.00.

The task force was formed to make recommendations to the Insulation Life SC concerning the 2 proposals for temperature rise changes to C57.12.00 clause 5, submitted by Dennis Marlow at the Amsterdam meeting in April 2001.

1) **Proposal 1** dealt with changes to the average temperature rise for ODAF cooling from 65°C to 70°C. Comments made during the meeting:
   - There may be up to 10 to 15% reduced capital cost
   - Losses will normally be high but total owning cost is generally lower
   - Users in Canada (Manitoba Hydro) as well as transformers built to IEC specifications are in service.
   - This type of cooling will apply to transformers with only ODAF cooling and not to ONAN/ODAF cooling
   - Transformers with reduced dimensional and weight restrictions will be a benefit from this proposal
   - Since the hot spot rise will be closer to the 80°C limit, these transformers may have extra loss of life.
   - One member stated that this proposal should not be an optional choice but should be mandatory if it is adopted

   A vote to refer the original Proposal 1 to the Insulation Life SC was defeated 10 negative and 2 affirmative

A vote from the members present for a modified proposal (see attached) was taken with 5 in favor, and 5 against. This proposal included several suggestions for revised wording received from the task force members.

2) **Proposal 2 dealt with changes to the average temperature rise of two windings that were located one above the each other.**
   - The members generally were in agreement that this proposal should proceed
   - Comments to modify the proposal to include the word individual and/or separate bushings will be incorporated into the modified proposal.

A vote to refer a modified proposal 2 to the Insulation Life SC for inclusion into C57.12.00 was carried 11 to 1

These modified proposals will be distributed to the Insulation Life SC before the next meeting in Raleigh for a vote when we will discuss the results of the Subcommittee ballot and comments.

There was no new business

The meeting adjourned at 12:15.

Respectfully submitted,

Dennis Marlow
Task Force Chair,

9.7.4 Old Business

9.7.4.1
Mike Franchek has balloted the reaffirmation of IEEE 1276, Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Transformers.

The ballot closed Oct. 5, and was successful with an 87% return and a 99% approval. Mike will be working to resolve the 1 negative, and prepare the document for the standards board.

9.7.4.2
Temperature Rise Tests
The chair reported that there were no new surveys received for the Resistance Correction Factors and procedures for determining cooling curve data. This survey was started as the first step toward implementing a suggestion to standardize the procedures for calculations of the heat run data. In Orlando, we reviewed the requirements in 57.12.90 that say the tester should use a curve fitting program or draw a smooth curve through the data points to determine resistance at time zero. We have established a general consensus that those words are insufficient for inclusion in a standard procedure, and the procedure should be standardized. The new task force will evaluate procedures to develop cooling curve data, and report the resistance at time zero, and revise the procedure to include a standard technique.

George Henry has agreed to lead the new task force to resume work on the test code to incorporate these changes. The task force will have its first meeting in Raleigh.

9.7.4.3
At our last meeting in Vancouver, a group met to review a request for interpretation of C57.100, Standard Test Procedure for Thermal Evaluation of Oil-Immersed Distribution Transformers. The response will be available to interested members.
During discussions and the preparation of the response, it was apparent that the document will need to be updated, not just re-affirmed, prior to its expiration date of 2004.

After the meeting, Roger Wicks responded to the call for a volunteer to lead the effort. He will establish a working group and hold the first meeting in Raleigh.

9.7.5 New Business

9.7.5.1
Dennis Marlow reported that Phil Hopkinson has forwarded a request from IEC for a definition of "thermally upgraded insulation". He will determine when a response was requested.
Discussion led to the conclusion that we don't know where to find a definition, and several members agreed to do some research to try to find it.

Jin Sim pointed out that IEC is actually looking for IEEE to provide a definition. If none can be found, then an official definition should be developed.

TV Oomen stated he has reference information, and that from experience he should be able to develop something.

Several members volunteered to collect data to formulate a definition. Some suggested that UL may have a useable definition in either document 1446 or 746.

9.7.5.2
The chair acknowledged, and introduced, Harry Gianakouros who has agreed to serve as the Secretary of the subcommittee.

9.7.5.3
Don Fallon reiterated his encouragement for members to become actively involved in the work of the committee, in this case particularly in the Loading Guide working group.

The meeting adjourned at 8:55 AM.

Respectfully submitted by:
Donald W. Platts, Chair Insulation Life Subcommittee
Min. Insulation Life SC 1002 .doc