Distribution Transformer Subcommittee Report

Chair:	**Stephen Shull**	**Vice-Chair**	
Secretary	**Jerry Murphy**		
Meeting Date:	**11/2/2011**	**Time:**	**9:30 – 10:45**

Attendance:

Members	**28**
Guests	**42**
Guests Requesting Membership	**9**
Total	**79**

Meeting Minutes / Significant Issues / Comments:

Steve opened the meeting; rosters were passed out, introductions were made & by a show of hands of members listed on screen showed we had quorum with 26 of the 47 members in attendance.

The minutes of the spring 2011 meeting of the subcommittee were presented and a motion was made by Gael Kennedy, seconded by Ron Stahara to approve the minutes; the motion carried by unanimous acclamation.

The following are the highlights of the reports that were submitted by the Working Groups and Task Forces. For further, detail please consult the individual reports.

- C57.12.36 –Distribution Substation Transformers

  Jerry Murphy opened the meeting at 8:03 AM on Monday October 31, 2011, in the Pacific AB Room of the Renaissance Waterfront Hotel, Boston, Massachusetts; introductions were made, and the attendance rosters were circulated. Quorum was reached with 17 of the 27 members present.

  The minutes of the Spring 2011 meeting in San Diego were presented and approved unanimously.

  Jerry informed that the PAR was submitted to Nescom, and that it will be reviewed for approval at the Nescom meeting in December 2011, and that even though the PAR had not been approved yet, the working could start on this meeting working on the review of the document with the comments that were left pending for future consideration when the standard was approved in 2007.

  The document with the comments was then reviewed. Gary Hoffman made a motion to reject the first comment because it was related with railway transformers, with the consideration that traction transformers had a separate committee. The motion was seconded by Steve Schroeder, and it was approved with no one in opposition.

  Some of the comments on the table seemed to have been addressed in the current standard.

  Steve Schroeder made a motion to disregard a comment about Distribution and Class I Power Transformers. Ron Stahara seconded the motion, and it was approved by the majority of the members with 11 in favor and 1 negative.

  Another comment that was rejected was related with the term Power instead of kilovolt-ampere ratings. After some discussion, Gary Hoffman made the motion to reject this comment, since it was not technically correct and kilovolt-ampere ratings was the standard term used on all other transformer standards. Lee Mathews seconded the motion and it was approved unanimously.

  Jerry said that he would send by email a draft 1 version of the new standard that will be under revision, with a password protection given to all the participants of the WG. Gary Hoffman asked to send also the file with comments along the draft. Jerry accepted, and asked the group to review the documents, and send any comments, so that they can be reviewed for the next meeting in Nashville, and that the PAR was expected to be approved by then.

  The meeting was adjourned at 9:00 AM.

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- C57.12.20 – Overhead Distribution Transformers

  The membership requirements of the WG were reviewed. Attendance at 3 of the last 5 meetings or last 2 consecutive meetings is required for membership. Since the Spring 2011 meeting, 3 members have been removed and 1 new member added. Membership stands at 30. Attendance of the membership was taken and 21 members were present and a quorum was established.

  The minutes of the Spring 2011 San Diego meeting were approved as submitted.

  The Chair reported that the recently balloted revision of the C57.12.20 was approved and has been published by the IEEE.

  The WG discussed whether natural ester fluids should be included in the scope of future revisions. Pressure relief valves were mentioned as one item that needs to be reviewed prior to any such change. A motion was made to change “mineral-oil immersed” to “liquid-immersed” which was seconded and approved with no opposition.

  A motion was made to accept the title, scope and purpose as modified during the meeting which was seconded and approved with no opposition.

  Following discussion on the temperature ratings of gasket concerns, Chuck Simmons agreed to email the results of the gasket survey completed 1-2 years ago such that the WG can discuss at a future time.

  Discussion was held on including 600 Volt secondary ratings in the C57.12.20 standard. Gael Kennedy agreed to go through the current revision and determine what changes will be required with the addition.

  Discussion was held on including 240/120 Volt secondary ratings in the C57.12.20 standard.

  It was agreed that discussion on including cautionary statements regarding high rates of pressure rise will be deferred until after the TF on Tank Pressure Coordination arrives at a consensus.

  Meeting was adjourned at 10:06AM.

- C57.12.38 – Single Phase Padmount Transformers

  The meeting was called to order by Mike Faulkenberry.

  A roll call was conducted to determine if a quorum was present. Twenty-two of thirty-two working group members were present at the time of the roll call. Therefore, a quorum was present.

  The minutes from the April, 2011, meeting in San Diego were presented and approved.

  Ali Ghafourian gave the status of the PAR. It is good through 2014.

  A review of Draft 1.3 which contained changes agreed to in the San Diego meeting was conducted and included the following:

  - It was noted that the scope of the document stated that the standard pertained to “liquid-filled” transformers as opposed to “mineral oil-filled” transformers. A discussion took place on whether or not the standard should address transformers containing natural ester fluids. A motion was made by Jerry Murphy to leave the document as “liquid-filled” and to include natural ester fluids in the standard. The motion was seconded by Steve Shull and was passed on a vote of the working group members. The manufacturers were asked to provide any changes that need to be made to the standard to account for natural ester fluid use.
  - The reference to IEEE Standard 386 in the Normative References had been revised to show the year of publication, 2006. Mike Faulkenberry took as an action item to ensure that the apparent reprint dated 2009 should not be the appropriate date.
  - Figure 4 was modified to address the fact that 250 kVA transformers and voltages of 120 volts and 480 volts are now included in the standard, and it has an effect on the stud size needed. Comments indicated that the table as included needed to be made a little easier to understand. Mike Faulkenberry will work on revising the table for the next meeting.
  - In Figure 5, 277/480Y was added as one of the new voltages covered by the standard. A question was raised about whether or not figures should be included to show dimensional requirements for the various new bushing arrangements in Figure 5. It was agreed that vertical elevation of the lower bushing, vertical separation to the second bushing level, and possibly horizontal separation dimensions needed to be shown. Rather than figures for all the possible bushing arrangements, it was

suggested that maybe one drawing with notes to cover other arrangements might be acceptable. Mike Faulkenberry will work on a drawing to address this issue for the next meeting.

Mike Faulkenberry asked the working group members to continue to review Draft 1.3 for any other changes or additions that need to be made.

Justin Pezzin gave a presentation on what had been found by the study group formed at the last meeting to study low voltage bushing cantilever loading. They found that some bushing manufacturers provided loading ratings, although they differed, while others did not specify an allowable loading. After some discussion, it was apparent that there are a number of variables that determine what the cantilever load rating will be. It was decided that in lieu of specifying a minimum loading capability in the standard, it may be a better approach to specify how to determine what the loading rating is so that it is done consistently. Carlos Gaytan stated that there was an IEC standard that addressed how to determine this load rating. He will provide the document number, and the working group will review this standard as a reference for specifying the proper method to determine the cantilever load rating for low voltage bushings.

The meeting was adjourned at 12:03 p.m.

- C57.12.34 – Three Phase Padmount Transformers

Ron Stahara called the meeting to order. To establish a quorum, the member list was displayed on the screen and those who saw their names were asked to hold up their hand. From this count of hands, a quorum was declared. Ron asked that everyone introduce themselves by giving their name, company and location. Also, an attendance roster was circulated. A motion was made by Gael Kennedy and seconded by Chuck Simmons to accept the minutes of the past meeting. It was approved by acclamation with no corrections.

Jerry Murphy reported for his task force concerning the dimensions of the following manufacturer's 600A products: Elastimold, Hubbell Power, Cooper Power System and Richards Manufacturing. He presented the following table while referencing the dimesion shown in Figure 18 of IEEE 386.

	Cooper		Elastimold		Richards		Hubbell	
	15 & 25 kV	35 kV	25 kV	35 kV	25 kV	35 kV	15 kV	25 kV
S1	4.93	5.85	3.88	5.09	3.9	4.9	------	------
S2	0.5	0.5	0.5	0.5	0.5	0.5	------	------
S3	8.29	12.46	8.25	10.13	8.3	10.1	------	------
S4 cap	2.15	2.66	4.41	2.3	4.3	2.3	------	------
TOTAL	15.87	21.47	17.04	18.02	17	17.8	15.63	15.86
S1	4.93	5.85	3.88	5.09	3.9	4.9	------	------
S2	0.5	0.5	0.5	0.5	0.5	0.5	------	------
S3	8.29	12.46	8.61	9.86	8.4	10.1	------	------
S3 SA	4.2	4.7	4.2	4.7	4.2	4.7	------	------
TOTAL	**17.92**	**23.51**	17.19	20.15	17	20.2	17.64	18.34

From this table it was determined that the depths for 600A terminations were 18" for 15 & 25 kV and 24" for 35kV.

Figures 9 and 12 of the current standard were reviewed. After a lot of discussion it was determined that the current table listing of the 21.1 and 21.1/36.6 kV column was created for the use of large 200 A interfaces. A consensus was reached for Steve Shull to rework these figures. These were to be resubmitted to the working group prior to the spring meeting with columns for 200 and 600 A interfaces as related to kVA sizes and voltages. Likewise he would rework the remainder of the pertinent drawings to insure that they reflect the new clearances as suggested from the discussion and deliver them as well.

Under new business, a discussion ensued concerning the placement of the cabinet depth dimension. Dwight Parkinson asked for a clarification as the dimension that had been shown in previous editions of the standard which was from the front of the faceplate to the outside of the cabinet had been changed in the current edition to that of being from the faceplate to the cabinet flange. Dwight felt that traditionally this had been interpreted to be

the cabinet clear dimension from the faceplate to the door. Gerry Paiva agreed with this position. Carlos Gaytan and Ali Ghafourian disagreed and believed that this was showing the cable opening for the compartment. After some discussion, it was decided that a side view should be added to this drawing similar to that shown in C57.12.38 to differentiate this dimension and in that way both items could be addressed. A motion was made to this effect by Jerry Murphy and seconded by Ali Ghafourian. It passed by acclamation. Steve stated that he would work this into the drawings and at the same time change the table to include the 200 and 600 A dimensions.

This concluded the meeting.

- C57.12.28 – Enclosure Integrity

  Introductions of members and guests

  A quorum of the Working Group's members was present (23 out of 33).

  The minutes of the April 12, 2011 working group meetings were approved.

  A review of the C57.12.28 standard was then started.

  Several sections of the standard (highlighted in yellow) which were revised after the San Diego Working Group meeting were presented to the Working Group (WG). None of these changes required any additional modifications.

  A concern was expressed by one of the members related to the security of the locking nut in a case where the penta-head bolt was not included in the closing of a device in the field. A wire could be inserted past the padlock and through the nut allowing contact with high voltage components on the frontplate. The following statement was prepared during the meeting: In the event that the bolt is missing the design shall be such that the cabinet remains inaccessible through the bolt hole (such as a blind hole). The working group than discussed several alternative statements and potential test methods. This issue was not resolved during the meeting and the following WG members were requested to develop a statement: Callsen, Ghafourian, Klaponski, Murphy and Rave.

  The working group was asked to review a test requirement for the doors to latch when the unit is closed and a lift and place test be added to the standard. The person requesting this change was contacted by the WG chairpersons. As a result of this discussion the following statement was added to section 4.3.6: *All door's latch points must engage when the door is closed. Two additions were suggested, as designed without adjustment and when the door(s) are closed.* A final statement will be prepared and presented to the WG at the next meeting.

  A potential problem was identified with the ability of Munsell to provide a consistent pad mount green color standard. After researching the Munsell Color System, it was determined that the system is still sound and a reliable company is managing the system. At the last WG meeting several users and manufacturing companies submitted sets of paint test panels coated with their pad mount green coatings. The gloss and color readings were presented to the WG and discussed. All color systems provide both high gloss and semi gloss standards of the same color. Therefore, the Munsell designations for both high gloss and semi gloss color chips will be included in the standard.

  Bibliography C18 referencing a source to obtain Munsell color standards needs to be updated and C57.12.30 added.

  The meeting came to a conclusion at 9:13 AM.

- C57.12.29 – Enclosure Integrity

  All of the enclosure integrity tests and requirements included in the C57.12.29 Standard were covered during the review of the C57.12.28 standard. These two standards are very closely related and share many of the same features.

  A statement to address the problems associated with the galling of stainless steel hardware was added to the standard. The statement utilized was the same one included in the pole mounted enclosure integrity coastal standard C57.12.30.

  The Munsell color standard designations for both the high gloss and semi gloss will also be included in this standard.

  There is only one source for outdoor coastal testing since the closure of the LaQue test site in North Carolina. The membership was again requested to research and identify a second source.

  Bibliography C18 referencing a source to obtain Munsell color standards needs to be updated and C57.12.30 added.

The meeting came to a conclusion at 9:13 AM.

- C57.12.35 – Distribution Transformer Bar Coding

  The WG met on Tuesday, November 1, 2011 at 9:30am in the Caspian Room of the Renaissance Waterfront Hotel in Boston.

  An agenda was presented and introductions were made. The Meeting Minutes from the previous meeting in San Diego, CA were reviewed. The minutes could not be approved as a quorum was not present.

  The wording on a proposed addition to Clause 4.1.6 concerning types of scanners was reviewed. The consensus was that the wording is acceptable. There was discussion as to the proper method to insert the information. The chair will check the current IEEE Style Manual to determine if wording should be added as a note in the clause or added as a footnote

  A suggestion was made by Steve Shull to increase the minimum height requirement of the bar code on the temporary bar code label from 0.24" to 0.50". It was agreed that this would be an improvement in the readability of the bar code. Manufacturers present at this meeting were asked to review their labels and bar code printers to determine if this change would present a problem. The Chair will contact other manufactures not present at this meeting to get their input on this change.

  A draft with the proposed revisions will be created for review at the next meeting.

- C57.12.37 – Electronic Test Data Reporting

  The meeting was called to order at 1:45pm in the Pacific AB Room at the Renaissance Hotel, Boston, MA.

  Introductions were done. The rosters were passed and role was taken to verify a quorum of the members. A quorum was met.

  Minutes from the meeting on 10/27/09 in Lombard, IL., the meeting on 3/10/2010 in Houston, TX., and the meeting on 4/12/2011 in San Diego, CA were reviewed and approved.

  Under old business, the working group reviewed the previously proposed changes to the standard which were related to the additions necessary by the Department of Energy Efficiency Rules. There was no other old business.

  Under new business, John Crotty informed the working group that prior to Nov 2011, the WG had been working on a PAR amendment, but the standard reached the end of its five year cycle and thus a new PAR was necessary. A new PAR request has been submitted to Nescom.

  John Crotty will review the roster again and reduce the members to those actively participating in the working group.

  Next meeting the working group will begin a review of the whole standard.

- TF Tank Pressure Coordination

  Carlos opened the meeting at 3:15 PM on Monday October 31, 2011, in the Pacific AB Room of the Renaissance Waterfront Hotel, Boston, Massachusetts; introductions were made, and the attendance rosters were circulated. Quorum was reached with 18 of the 32 members present.

  Minutes from the Spring 2011 meeting in San Diego were approved. Ron Stahara made the motion, and Paul Chisholm seconded it.

  Carlos presented a summary of the Spring 2011 meeting, where a motion was approved to create a Title, Scope and Purpose to create a PAR for the TF to move into a working group.

  The following was the discussion around the Title, Scope, and Purpose:

  - We should make a note to insure the standard doesn't cover external impacts, such as falling ice hitting windfarm transformers.
  - There was a concern that the purpose as written was too broad and could open up the need for new testing to be completed in the area of dynamic pressure rise and tank withstand. Steve Shull and Carlos Gaytan mentioned that although the purpose is broad, the intention is to collect and standardize the information that is already in the various standards, and that the WG can still decide to further revise the scope at a later time.

- Steve Shull discussed the need for the group to make a decision on whether or not to move forward as this was the last meeting for the TF and if no decision to form a WG was made today then the TF would be disbanded.
- Carlos mentioned that fusing may need to be considered when attempting to describe all possible methods for tank rupture protection as a result of dynamic pressure rise. Gerry Paiva had a strong opinion against discussing fusing as fuses fall under the accessories which these do not cover, and introducing them into the standard would open a discussion into which the transformers committee had previously decided not to engage. Gerry further suggested that this WG "not go down that road".
- A comment was made to ensure that when this WG is considering natural ester fluids we should get representatives from the fluid manufacturers to describe the special requirements for each of the respective natural ester fluids.

Steve Shull made a motion to move forward with application for a PAR with the title, scope and purpose as presented by Carlos. This motion was seconded by Ali Ghafourian. The floor was opened for further discussion but none was given. The motion was voted and approved with no opposition.

Carlos concluded the meeting by reviewing the actions made by the working group which was to apply for a PAR with the information he had presented. If this PAR is approved, Carlos Gaytan would prepare a first draft of the document to be submitted to the working group at the Spring 2012 meeting in Nashville.

The meeting was adjourned at 4:07 PM.

- TF – Transformer Efficiency and Loss Evaluation (DOE)

Mr. Hopkinson reported that Brian Coffey from Navigant was unable to attend the meeting. Navigant Consulting is a contractor working for DOE on the distribution transformer efficiency rulemaking.

1. Mr. Hopkinson reviewed slides from his presentation titled "Distribution Transformer Energy Efficiency Task Force." The presentation is posted on the IEEE Transformer Committee Website under the Distribution Transformers Subcommittee as "Fall 2011 Agenda & Presentation."
    a. Brief overview of the Negotiated Settlement in process for New Final Rules
        - Richard Parker was appointed by DOE as facilitator for this group.
        - There are two negotiating teams; one for Low Voltage Distribution Transformers, and one for Medium Voltage Distribution Transformers /Liquid-Filled
        - Timing is short for these teams because the target for their final Agreement is the end of 2011
        - The Agreement must have 100% consensus between all parties.
    b. Conservation advocates want higher efficiency, manufacturers and users want economically justified efficiencies while using widely available materials.
    c. Major push is to verify economic models, BIL sensitivity, and impacts on suppliers, manufacturers, and users.
    d. If Agreement is not reached, the decision reverts back to traditional rulemaking.
    e. Meetings scheduled November 8-9, and November 30-December 2.
2. Studies by Phil Hopkinson, Carlos Gaytan, and Wes Patterson were presented.
    a. Mr. Hopkinson reviewed portions of his analysis that was submitted to DOE.
        - There are inaccuracies in the OPS model used by DOE, It underestimates the amount of material used for these designs

- There does not appear to be economic justification for higher efficiencies than the current mandatory levels.

b. Carlos Gaytan reviewed his report submitted to DOE which highlighted steepness of the cost curve of amorphous steel compared to M3 steel.

c. Wes Patterson reviewed his reports submitted to DOE:

- One report highlighted efficiency rules from other countries around the world.
- One report showed the weight of the transformer as efficiency is increased. 30% reduction in losses resulted in 15% increase in weight. If restricted to M3 steel, a 30% reduction in losses will result in 85% increase in weight. The conclusion of this report shows DOE analysis underestimates the weight of more efficient transformers.

3. DOE rulemaking does not cover rebuilt transformers. There is a price point where users will opt to rebuild transformers rather than purchase a new, more efficient transformer.

4. There was not any new business.

The next meeting is planned for the Spring 2012 in Nashville.

The meeting adjourned at 4:32 PM.

Old Business:

Steve asked if there was any old business to review and none was presented.

New Business:

Steve briefly discussed the changes to the overall meeting agenda that will occur at the next TC meeting in Nashville, TN in an effort to have better participation in the overall committee & WGs. Of interest to the Distribution Transformers SC, the EL&P (user only) meeting will move to Sunday at 3pm facilitated by Jerry Murphy.

Jerry Corkran thanked Phil Hopkinson for the DOE TF and their efforts further stressing that members get involved by contacting their legislators & regulators stressing the need to not burden the public with extreme efficiency standards that will have unintended consequences to the end consumers.

Phil Hopkinson responded in agreement. Chuck Simmons (another DOE panel advisor) indicated he was hopeful the DOE will accept the recommendations the advisory panel has submitted considering the real desire is to reduce cost to consumers and some of the proposed regulations would not meet that goal and would add to consumer cost.

Steve Schroeder made a comment concerning NEMA TR-1 not keeping pace with the industry.

Steve adjourned the meeting with unanimous consent at 10:38am.