# Distribution Transformer Subcommittee Report

**Chairman:** Stephen Shull

**Meeting Date:** 10/24/2012 **Time:** 9:30 – 10:45

**Attendance:**

| | |
|---|---|
| **Members** | **28** |
| **Guests** | **45** |
| **Guests Requesting Membership** | **12** |
| **Total** | **85** |

## 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 28 of the 43 members in attendance at the start of the meeting.

The minutes of the fall 2012 meeting of the subcommittee were presented and a motion was made by Ron Stahara, seconded by Lee Matthews to approve the minutes; the motion carried by unanimous acclamation.

The following are the reports that were submitted by the Working Groups and Task Forces.

- **C57.12.36 –Distribution Substation Transformers**

  Jerry Murphy called the meeting to order. Introductions were made. The names of the members were projected on the screen. By a show of hands, a quorum was established by having 14 of the 26 members present.

  The minutes of the Spring 2012 meeting in Nashville were presented. Ron Stahara made a motion to approve the minutes as written, seconded by Paul Buchanan. It was approved unanimously.

  Jerry announced about the formation of a Task Force for Dielectric Fluid Terms Normalization to resolve the proper use of the terms like fluid and liquid.

  A review of the Draft 2 of the C57.12.36 standard was then started.

  Sections 5.1.3 and 5.1.4 for liquid and winding temperature indicators were reviewed with proposed modifications made by Gary Hoffman.

  The discussion of these sections covered the requirements for digital displays. The proposed changes were according to the current standard C57.12.10. Among the changes, the height of the characters was removed and the display colors were included.

  Figure 1 was reviewed. Discussed about the use of terms like “Available when specified” and “As required” for some of the items. Gary Hoffman suggested to adopt “S” for “standard” and “A” for “available when specified”, as in C57.12.10.

  There was discussion about the use of pressure relief valves, pressure relief devices and pressure vacuum bleeder valve. Some concerns about the possibility of moisture ingress.

  Gary Hoffman mentioned a potential issue since the scope of this standard covers 50 Hz, and section 5.11.2 which covers fans only includes characteristics of 60 Hz motors. He suggested following what was done in C57.12.10 to include characteristics of 50 Hz motors with IEC standard voltages.



**Submitted By:** Jerry Murphy
**Date:** 10/24/2012

Regarding the use of the terms fluid or liquid, Steve Shull mentioned that the new Task Force is developing a white paper on this subject. Gary Hoffman suggested requesting a consensus with the IEEE Transformers Committee Membership.

Jerry mentioned that the draft with the changes from this meeting would be posted soon after the meeting, and encouraged the group to review it and provide comments.

The meeting was adjourned at 10:55 AM

- **C57.12.20 – Overhead Distribution Transformers**

  Introductions of members and guests were made.

  A quorum of the Working Group's members was present (27 out of 36).

  The minutes of the Spring 2012 Nashville meeting were approved as submitted.

  Al Traut reported that NESCOM approved a PAR in June of 2012. The PAR expires on December 31, 2016.

  Al Traut reported that there is a new Task Force led by Patrick McShane that will review changes needed to support the change from "mineral-oil immersed" to "liquid-immersed" throughout the IEEE transformer documents. Al Traut will represent C57.12.20 on this task force and report back to the WG at our next meeting.

  A recent survey on whether Annex A is needed was discussed. Feedback from the WG was that only Type C support lugs should be covered in Annex A and that the crossarm hangers and kickers could be eliminated. Chuck Simmons will follow-up with two survey replies that wanted Annex A left intact in its entirety.

  A survey of whether Users currently require or potentially want to include in the standard specific impedance and/or regulation requirements was discussed. Chuck Simmons will compile the responses regarding specific suggestions on impedance and regulation from the survey results.

  A recent survey on whether the standard should have temperature requirements for gaskets was discussed. The WG indicated a desire that all affected components should be included in any temperature requirements. Al Traut will put together proposed language on temperature range requirements for the WG to consider.

  Josh Verdell and Marty Rave reviewed low voltage bushing mounting and stud dimensions. Josh and Marty will survey manufacturers for LV bushing stud size and tank mounting hole requirements.

  Gael Kennedy discussed work needed to add additional low voltage ratings to the standard. The changes would essentially revise information in the standard to include voltages of 600 Volts and less. Chuck Simmons will include Gael's suggestions in a new draft D1 for the next meeting.

  Al Traut discussed a recent concern raised by a User that transformer base requirements for platform mounted overhead transformers aren't included in the current standard. This will be addressed at a future meeting.

  Meeting was adjourned at 12:30 PM.

- **C57.12.38 – Single Phase Padmount Transformers**

  Twenty-eight of thirty-seven working group members were present and a quorum was established.



**Submitted By:** **Jerry Murphy**
**Date:** **10/24/2012**

A motion was made by Kent Miller to approve the minutes from the Spring 2012 meeting, seconded by Ron Stahara, and passed unopposed by the working group members.

Low voltage bushing arrangements were added to Draft 1.3 of the document as Figure 5 at the last meeting. Tom Holifield discussed revisions made to Figure 5 since the last meeting. Also, Tom discussed new Figure 6, the low voltage bushing dimensions, which was added to the document in Draft 1.4 for this meeting. Alan Wilks made a motion that we accept Figure 5 and Figure 6 as shown. The motion was seconded by Ron Stahara, and the motion passed unopposed.

In response to a request at the last meeting the following line was added to the first paragraph of Clause 7.4 in Draft 1.4: "The hinge assembly shall include a captive means, such as a roll pin, to prevent accidental removal of the door or doors when they are in the open position." Ron Stahara made a motion that the line be accepted as written in the document. It was seconded by Steve Shull and passed unopposed.

A discussion about how to incorporate natural ester fluids into the document was briefly held. Steve Shull stated that there should be some guidance coming on how this should be done from the subcommittee.

The last major item to be resolved is how to address low voltage bushing cantilever strength requirements. Chuck Simmons presented requirements from his company's specification. Chuck was assigned to prepare verbiage for the document that the working group will consider at the next meeting.

Michael Miller presented videos from his company showing how they have revised the angle of the parking stand to make it work better for the crews. After some discussion, the working group decided to leave the parking stand drawings as they currently are in the document.

Still not revised in the document is verbiage to address concerns about the tank pressure requirements that contributed to the formation of the task group and now working group C57.12.39. A concern was raised that the C57.12.39 working group probably would not be finished with their work before our document's PAR expires. It was decided to leave this subject as currently written. It will be revised with the next PAR after the C57.12.39 working group completes their work.

The next meeting will be held in Munich, Germany, and by a show of hands, not many working group members knew for sure they would be able to attend. Another few knew they definitely could not come, and the vast majority was not sure if they could attend, leaving concern that a quorum may not be possible in Munich.

- **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 Ali Ghafourian to accept the minutes of the past meeting. It was approved by acclamation with no corrections.

Ron stated that we had reviewed the document and corrected the cabinet dimensions which were discussed last time. Ron intent was to bring this document to the working group with a recommendation of taking this to ballot. However, an application was brought to the attention of the working group of when a grounding-impedance is place in between the neutral bushing and the ground to limit the neutral fault current. Dwight



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Parkinson, Cooper, stated that he had seen this specification from customers and that when this occurs, the clearances and BIL levels of the H0, X0 or H0/X0 bushing that we current specify in the document would not be correct. After some discussion, the following correction was made to the document.

**Section 8.7.4.2 Neutral Terminal – Greater than 600 Volts.**

When provided *and effectively grounded*, the neutral bushing may be two insulation classes below that of the phase bushings. *Otherwise, the neutral bushing shall be the insulation class of the phase bushings.*

A motion was made by Dwight Parkinson and seconded by Dan Mulkey to make this modification. It was passed by acclamation with no dissenting voices. This statement was reflected by changes in Figures 2, 3, 6, and 7. Each drawing was corrected by a motion and approving acclamation vote without any descent as shown in the table.

| Figure | Motion Made | Seconded | Figure | Motion Made | Seconded |
|---|---|---|---|---|---|
| 2 | Dwight Parkinson | Ali Ghafourian | 6 | Dwight Parkinson | Adam Bromley |
| 3 | Dwight Parkinson | Ali Ghafourian | 7 | Dwight Parkinson | Adam Bromley |

The details of these changes are shown in Draft 4 of the document. It was determined that Steve Shull would by the next meeting make these modifications and post the new version.

After we went through this discussion and voting, Jeff Schneider, Cooper, brought up another issue of the location of the H0, X0 or H0/X0 for dead front construction. Ron Stahara formed a TF to study where the location of this bushing should be placed on the faceplate of the transformer. The Chair of this TF was named to be Jeff Schneider. The members of this TF were Donnie Trivitt, OG&E, Chuck Simmons, Progress Energy, and Sheetal Patel, ERMCO. Jeff requested the drawings for these be sent to him so that the TF could work on this dimensioned drawing. Steve stated that he would send these to him. The TF will report at the next Working Group meeting.

This concluded the meeting.

- **C57.12.38 – Tank Pressure Coordination**

  Twenty-eight of thirty-seven working group members were present and a quorum was established.

  A motion was made by Kent Miller to approve the minutes from the Spring 2012 meeting, seconded by Ron Stahara, and passed unopposed by the working group members.

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- **C57.12.28 – Pad- Mounted Equipment – Enclosure Integrity**
  - Page 1 Normative References – added title of ASTM B117
  - Page 8 Section 4.3.6 Operation Test – reviewed , no change
  - Page 8 Section 4.3.7 Test Repetition – motion carried unanimously to revise to:
    - These design tests shall be repeated whenever the enclosure design is changed so as to modify performance, or at least every five years whichever is shorter.
  - Page 14 Annex B Pry Bar footnote #9 – motion carried unanimously to revise to:
    - The plunger has been designed to fit into a100ft-lb, 1/2" drive, dial-type Snap-On® model TE100 torque wrench. At the time of publication of this standard, Snap-On® was an example of this technology. This information is given for the convenience of users of this standard and does not constitute an endorsement by the IEEE of this product. Equivalent technology may be used if it can be shown to lead to the same results.
  - Page 18 Bibliography additions and changes
    - Added C57.12.38
  - Motion and Vote to go to IEEE Balloting
    - Steve Shull motioned, Gael Kennedy seconded, passed unanimously

- **C57.12.28 – Pad- Mounted Equipment – Enclosure Integrity for Coastal Environments**
  - Page 6 Normative References – added title of ASTM B117
  - Page 8 Added Section 4.1:

    4.1. Galling

    Steps need to be taken to prevent galling, as follows:

    4.1.1. Use of dissimilar materials in threaded joints such as silicon-bronze with stainless steel, brass with stainless steel, etc.

    4.1.2. Use of anti-seize compounds or materials
  - Page 9 Section 4.2.8 – made the same as Section 4.1.8 in C57.12.28
  - Page 12 Section 4.4.6 – made the same as Section 4.3.6 in C57.12.28
  - Page 12 Section 4.4.7 – made the same as Section 4.3.7 in C57.12.28



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- Page 14 Section 5.3.2 – revised the frequency of outdoor exposure testing:
  For all except the Outdoor Exposure Test, this data shall be resubmitted whenever there are changes in the substrate or coating system method and/or materials, or at least every two years. The Outdoor Exposure Test shall be resubmitted whenever there are changes in the substrate or coating system method and/or materials, or at least every five years.
- Page 15 added Munsell color footnote to 5.4 same as in C57.12.28
- Page 15 Section 5.51 Added "Outdoor" to "Exposure Test"
- Page 15 Section 5.5.1.1 – Added Kennedy Space Center
- Page 17 Section 5.5.3 – Added ASTM Blistering evaluation method per C57.12.30
- Page 17 Section 5.5.5 – remove crazing and add cracking per C57.12.30
- Page 17 Section 5.5.7 – Make chip rating the same as C57.12.30
- Page 20 revised torque wrench footnote to match C57.12.28
- Pages 24 and 25 Bibliography additions and changes
  - Added C57.12.38
- Motion and Vote to go to IEEE Balloting
  - Steve Shull motioned, Gael Kennedy seconded, passed unanimously

- **C57.12.31 – Pole- Mounted Equipment – Enclosure Integrity**

  Bob Olen reported discovering an error in Section 4.5.6 Simulated Corrosive Atmospheric Breakdown (SCAB) Page 8. It should require 10 SCAB cycles not the 15 that is stated in the 2010 Standard. The 2002 standard had 10 SCAB cycles. A motion to issue an IEEE Core Agenda to correct this error was passed. Bob Olen will initiate a Core Agenda.

- **C57.12.37 – Bar Coding for Distribution Transformers and Step-Voltage Regulators**

  The WG met on Tuesday, October 23, 2012 at 9:30 am in the Walker Room of the Hilton Milwaukee City Center Hotel in Milwaukee, WI.

  An agenda was presented and introductions were made. There was a quorum present at this meeting. The Meeting Minutes from the previous meeting in Nashville, TN were reviewed. After a brief discussion, the minutes were approved.

  A question was asked in regard to which utilities uses the bar code on purchased transformers. From the end-users present at this meeting, only one stated that they currently use the bar coding.

  The Chair asked if anyone had any additional comments or changes to be made on the standard. There were no additional comments made.

  Bob Olen made a motion to ballot the standard, Ron Stahara seconded the motion. The motion was unanimously approved.

  The meeting was adjourned at 11:05 am.

- **C57.12.37 – Electronic Reporting of Distribution Transformer Data**

  The meeting was called to order at 4:45pm. Introductions were done. Roster was taken, and a quorum was met. Minutes from the meeting on 3/13/2012 in Nashville, TN were reviewed and approved.

  The draft standard is posted on the website. Issues from the current standard besides the DOE required data were requested. None were mentioned. The chair asked that the standard be reviewed before the next meeting to insure that no issues existed. He stated that the DOE have not finalized their ruling. Any changes to the DOE section of the standard will wait until the next meeting once the DOE ruling has been published.

  Dan Mulkey, Pacific Gas and Electric, gave a presentation on the way his company uses electronic data reporting. Dan showed various manufacturers data files. He indicated



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that the when CSV or excel files are provided they are easy to open and require little repair. However, he pointed out that merged cells and headers were particularly troublesome. He said that this might be something that we could address in the standard. He also pointed out that text files do not import quite so easily due to alignment of the data as the file is imported. He indicated that this type of import requires a careful examination of each column of data. Dan demonstrated the import of data into the access database that he had developed for his company. He pointed out that he had used this database since 1990. The program can help the user spot outliers. Dan stated that he provides an average impedance value from this database every 5 years as well as minimum impedances for fault current calculations to his company's designers. He added that his company targets a maximum 6 volt drop on the primary and another 6 volts on the secondary. Dan stated that he would be glad to provide a blank Access database for those who would want to start using this type of analysis in their own company. He stated that those interested could contact him directly.

The meeting was adjourned at 5:25pm

- **Task Force on Department of Energy Activity on Energy Efficiency of Transformers**

  The Task Force on DOE Energy Efficiency of Transformers was called to order at 1:45 PM on October 23rd, 2012. The new secretary was introduced. A hand count of the members was made and a quorum was declared. The chairman briefly reviewed the contents of the minutes. A motion was made and seconded to approve the minutes; the motion was approved.

  The chairman informed the TF that he does not expect the DOE final ruling on the NOPR until after the elections. The chairman reviewed the history of the NOPR that was issued by the Department of Energy. He walked through the tutorial he had prepared on the NOPR. He further highlighted some key elements. In the new NOPR the reference to TSL is not the same as efficiency level and that Table 3 is not the same as appears in the 2010 law, particularly separating single phase (reducing losses from 6.2% to 12%) and three phase (reducing losses from 5.2% to17%) transformers and reducing losses in liquid and low voltage dry type transformers.

  In Table 4 he noted that anything > 25-30% in 3 phase reduction appears to be very excessive and needs attention. In further discussion he mentioned that the reaction to the NOPR issued 10 Feb 2012 was favorable from NEMA, EEI, Utilities, and conventional steel manufacturers. A concern was expressed regarding the crossover between M3 and Amorphous, and the fact that the DOE never understood this concept.

  Negotiations were completed. NEMA had prepared and submitted comments by the 28 June 2012 deadline. The chairman asked Mr. Caskey from NEMA to give a presentation on the negotiation process. He made a few observations on the negotiating process. Both the manufacturers and utilities were honest and forthright in providing the consultants valid data for their models. Going forward these consultants will now have better data that they can use to improve their models. A better understanding was achieved with the other participant's. Finally, the process in itself was valuable even w/o a negotiated settlement. The chairman asked Mr. Patterson to provide his comments and any known status. He mentioned that an agreement was reached on medium voltage dry, and that when the NOPR does finally come out there might be some new proposed standards for product classes that fall outside the proposed efficiency levels. There was no new status to report on when the date for the final rule is expected.

  A comment was made from a member that the life cycle cost analysis that had been completed previously by the chairman be included in the minutes as it was felt that the



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DOE version is inadequate. The Chairman would provide analysis and it would be posted. A comment was made from an IEC delegate that they are seeing a similar issue in Europe; this is in the early stages. There was no new business. The next meeting will be held in conjunction with the IEEE Transformer Committee meeting in Munich Germany during the week of March 17-21st, 2013.

The meeting was adjourned at 3:00 PM.

At the conclusion of the report by Phil Hopkinson, Marty Rave asked if anyone was questioning DOE's methods for setting efficiency. Phil said that there has been. Wes Patterson of Navigant concurred with this. He continued to make further comments on the DOE analysis indicating that it was the same process that they had used to analysis other products for energy efficiency. He said that it was very complicated and difficult to follow.

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

Steve Shull made the following comments:

- Steve solicited from the group ideas for technical tutorials. He asked that these be passed to Tom Prevost.
- Steve commented that a TF on terminology of fluid had been formed. Its purpose was to give consistency to the terms that referenced fluids in our standards. He asked members to assist Jerry Corkran in reviewing our standards for these terms.
- Steve reminded members that balloting notification requires proper selection of interest under MyProject. These are located under the individual preference. It is from this list that email notifications are generated for standard activities.
- Steve requested a show of hands from attendees who were considering making the next meeting in Munich, Germany. A number of hands went up. Steve emphasized the benefits of collaborating with our European counterparts who have an interest in these standards.

Steve Shull asked if there was any new business. With this request Phil Hopkinson came to the front and presented a PowerPoint on hydrogen gassing in wind farm transformers. He pointed out that this phenomenon was not just isolated to wind power units but can exist on certain type of transformer designs where 35 kV high side voltage is present. This presentation discussed the possible cause and suggested a couple of solutions. Ron Stahara asked if presentation could be posted. Steve believed that this was an excellent idea and would see that this was done. He also requested the group review the information for further discussion. He pointed out that some thought also be given to what to do with this information.

Steve adjourned the meeting with unanimous consent at 10:48am.



**Submitted By:** **Jerry Murphy**
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