

Distribution Transformer Subcommittee Report

Chairman: Stephen Shull

Meeting Date: 10/23/2013 **Time:** 9:30 – 10:45

Attendance:

Members	<u>39</u>
Guests	<u>54</u>
Guests Requesting Membership	<u>13</u>
Total	<u>106</u>

Meeting Minutes / Significant Issues / Comments:

Steve opened the meeting and rosters were passed out. The members were listed on the screen and by a show of hands, it was discovered that we had a quorum with only 32 of the 51 members in attendance.

Fall 2012 minutes were motioned for approval by Kent Miller & seconded by Ron Stahara. The subcommittee approved these without opposition.

Spring 2013 minutes were motioned for approval by Phil Hopkinson & seconded by Ron Stahara. The subcommittee approved these without opposition.

Each of the working groups that met reported as follows.

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

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 the quorum was reached by having 12 out of the 21 members present.

The minutes of the Fall 2012 meeting in Milwaukee were presented. A motion was made by Gael Kennedy and seconded by Steve Shull to approve the minutes as written. The minutes were approved unanimously.

Then the minutes from the Spring 2013 meeting in Munich were presented. A motion was made by Dwight Parkinson and seconded by Terry Martin to approve the minutes as written. The minutes were approved unanimously.

Draft 3 of the standard was reviewed. Section 5.11.2 on fan motor voltage and frequency was discussed. This section was updated with the comments made at the Spring meeting in Munich, and following the current version of the C57.12.10 Standard; the motor voltage for 60 Hz was now limited to 240 V. Gary King and Dwight Parkinson mentioned that there were motor voltages other than 240 V that are in use to accommodate to the transformer secondary voltage rating. John Rossetti provided a table with a study of what manufacturers offered on motor characteristics.

After some discussion, Steve Shull made a motion, seconded by Gael Kennedy, to table this topic, and have further discussion with Gary Hoffman, in order to prepare a revised draft to be reviewed either before or at the Spring 2014 meeting. The motion was approved unanimously.

Jerry mentioned that he would prepare a revised draft in the next 60 days, requesting the group to study it and provide comments back, to try to reach consensus prior to the Spring 2014 meeting in Savannah, to be ready at that meeting to vote on to going to ballot; if not before.

The meeting was adjourned at 3:00 PM

- **C57.15/IEC 60076-21 - Step-Voltage Regulators – Craig Colopy**

As this is a new Task Force there isn't a quorum requirement.

Munich unapproved Minutes were noted but because there was no task force at that time, no approval was needed. Blank rosters were passed out for interested personnel to sign up for Task Force Membership.

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Jodi Hassz gave a presentation of the IEC/IEEE Dual Logo Agreement for Joint Development. This provided the background and basis for the process to be followed in this revision.

Craig provided a short list of items that needed to be considered for the coming updated, including:

- Reflect the latest revisions of referenced documents IEEE Std C57.12.00™ **Error! Reference source not found.**, IEEE Std C57.12.90™ **Error! Reference source not found.**, IEC 60076-1, IEC 60076-2, IEC 60076-3, IEC 60076-4, IEC 60076-5, IEC 60076-7, IEC 60076-10, IEC 60214-1 eliminating duplicating applicable text.
- Adapt the latest IEC approved format.
- Include additional references to applicable IEC standards, keeping IEEE standard references to a minimum. Due to this status as a dual logo (IEC/IEEE) document, the work is done as a joint review by IEEE and IEC.
- Review the requirement for 55 C winding temperature rise ratings versus 65 C winding rise.
- Add Sound Levels and description of tests
- Add a tank rupture type test.
- Add PD type test.
- Include a Control Compatibility type test
- Update IEC standard references for Control type tests.
- Include a section covering routine and design tests of On Load Tap Changers
- Clarify further short-circuit requirements for distribution and substation applications, revising where applicable (Additional Note?).
- Include external dielectric clearances
- Address comments from IEEE Ballot Process that were deferred until next revision.
- Address comments from IEC Ballot Process that were deferred until next revision.
- Meeting adjourned at 17:56 just in time to make it to the tour.

Subsequent to the meeting:

- Alan Peterson – NETA Representative requested Committee Membership.
- Comment from Section 5.12 'Power Supply for Transformer Auxiliary Equipment' in the C57.12.36 Sept 2012 draft standard. (Also Section 5.9.2 of C57.12.10-2010)
- Add Annex covering "Bypass of Neutral"
- Add Annex for Platform mounting
- Make note of the Acceptance Testing Standard and the Maintenance Testing Standard from ANSI/NETA (InterNational Electrical Testing Association). (ANSI/NETA ATS-2013 and ANSI/NETA MTS-2011)

After the report was given, Jodi Haas spoke to the IEC requirements for revision. She said that five countries must agree to provide experts for the process before this could begin. This group currently has one USA and will need four others to volunteer to be involved before this can move forward.

- C57.12.20 – Overhead Distribution Transformers – Alan Traut

Introductions of members and guests.

Al Traut provided the Chair's Report. The current PAR expires December 31, 2016. The 10-year cycle ends December 31, 2021.

Al Traut provided an update on the Task Force charged with the replacement of "mineral-oil-immersed" with "liquid-immersed".

A quorum of the WG's members was present (30 out of 36 members were present).

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The minutes of the fall 2012 Milwaukee and the Spring 2013 Munich meetings were discussed and approved.

The first order of old business that was discussed was the discussion on adding minimum or maximum impedances to the document. Steve Shull suggested taking the 65kA breaker limitation into account during future discussion. Al Traut volunteered to put together a table of impedance values that the WG can discuss in the next meeting.

Next, Josh Verdell presented the research that he and Marty Rave had gathered regarding Low Voltage Bushing interchangeability dimensions. It was noted by Steve Shull that any bushing requirement belongs in the bushing standards. John Rossetti made a note that all applicable voltages need to be defined. The spreadsheet showing the research will be made available.

The last order of old business that was discussed was in regards to Platform Mounting requirements for overhead type transformers. Survey information was presented to the WG. Marty Rave provided a typical installation schematic. Steve Shull asked if this discussion needs to be addressed with the regulator group. Steve Shull also asked if the direction for this discussion would be to add an ANNEX covering this information. A straw-pole of the meeting attendance indicated that more people want an informational annex provided than do not.

James Gardner, Ali Ghafourian, Dan Mulkey, and Said Hachichi volunteered to gather information regarding platform and mounting dimensions for discussion at the next meeting.

No new business was brought up during the meeting.

Meeting was adjourned at 12:10 PM.

- C57.12.34 – Three Phase Pad-mount Transformers – Ron Stahara

Ron Stahara called the meeting to order. To establish a quorum, a 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, it was determined that a quorum was established. Ron asked that everyone introduce themselves. Also, an attendance roster was circulated. The complete detail of attendance is recorded in the AMS system. A motion was made by Mike Faulkenberry and seconded by Justin Pezzin to accept the minutes of the Fall 2012 meeting as written. The motion was passed unanimously. A motion was made by Paul Henault and seconded by Justin Pezzin to accept the minutes of the Spring 2013 meeting as written. The motion was passed unanimously.

A discussion was continued from the spring meeting concerning the location of the H0 bushing. Jeff Schneider's presentation was referenced in the discussion and reviewed by Steve Shull. The discussion resulted in a suggestion that we draw the different configurations suggested in the discussion as well a common statement of user preference. This would then be circulated to the members for review before the next meeting. This would then be finalized at the next meeting.

An agenda item was raised to address a question concerning a section in the 2012 NESC:

381. Design

G. Pad-mounted and other above ground equipment

2. Access to exposed live parts in excess of 600 V shall require two separate conscious acts. The first shall be the opening of a door or barrier that is locked or otherwise secured against unauthorized entry as required by Rule 381G1. The second act shall be either the opening of a door or the removal of a barrier.

Steve Shull suggested that if the design was deadfront, the voltage exposed was less than 600 volts. This was based on the previous designs using a hood design on single phase units. The common consensus of the group was that this was true. After some discussion and wordsmithing by the group, the following section in the draft was changed to read as follows:

8.3 Access

Each compartment shall have a door so constructed as to provide access to the higher voltage compartment only after the door to the lower voltage compartment has been opened. There shall be one or more additional captive fastening devices that must be disengaged before the higher voltage door can be opened. If the lower voltage compartment has exposed live parts that are over 600 volts, a non-hygroscopic barrier shall be placed so as to require its removal or opening before access to the lower voltage compartment can be attained. Where the lower voltage compartment door is of a flat panel design, the door shall have three-point latching with a handle

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- C57.12.37 Test Data Reporting – John Crotty

The meeting was called to order at 3:20pm.

Introductions were done.

Roster was taken, quorum was met.

Minutes from the meeting on 10/23/2012 reviewed and approved.

Old business:

1. The chair asked the WG if there were any changes or issues found from the review of the standard. None were found.

2. The chair asked if there were any needed changes due to the new DOE ruling. None were found.

New Business:

The chair asked for a motion to move to ballot. The motion was approved. We will move forward with the ballot process.

Adjourned at 3:50pm

- C57.12.38 Single Phase Padmount Transformers - Ali Ghafourian

Ali Ghafourian opened the working group meeting at 1:47 p.m. Twenty-six of thirty-four working group members were present and a quorum was established.

A motion was made to approve the minutes from the fall 2012 meeting, it was seconded, and the motion was passed unopposed by the working group members.

Ali stated that the PAR expires at the end of 2014 and that we need to resolve the remaining issues, if possible, in this meeting so that the document can be sent to ballot.

Ali explained that there is a subcommittee task group working on the verbiage needed to incorporate natural ester fluids into standards. That work will not be completed prior to our PAR expiration and, therefore, this issue will have to be addressed in the next PAR.

The document also has not been revised to include 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. That working group will not be finished with their work before our document's PAR expires. It was decided in the last meeting 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 last major item to be resolved is how to address low voltage bushing cantilever strength requirements. Prior to the meeting, a proposed paragraph to address this was sent out to the working group members. Mike Faulkenberry presented the paragraph to the group and substantial discussion was begun. There were a number of questions and concerns about the test values and the test method. Steve Shull made the working group aware that the bushing subcommittee would be setting up a task force, and potentially a working group, to address distribution bushings. Steve made a motion, which was seconded by Ron Stahara, to table this item until the next PAR and to review it again at that time when the bushing subcommittee addresses the issue. The motion passed with 24 voting for, and 2 against.

A quick review to go over the changes in Draft 1.4 of the document was conducted. There was a question about the requirement in Clause 7.6 for lifting provisions being "permanently attached." Most manufacturers provide permanently attached inserts for using lifting bolts. The question was whether or not that met the "permanently attached" requirement or if some form of lifting hooks needed to be required. It was stated that historically that type of requirement was discussed but not included previously in the document due to the risk management issues associated with having protrusions on the transformer that could become a hazard to the public.

After the document review and no further questions or comments, Ron Stahara made a motion that Draft 1.4 be accepted and that the document be sent to ballot. That motion was seconded by Steve Shull and the motion passed unanimously.

No new business items were suggested, and the meeting was adjourned.

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- C57.12.39 Tank Pressure Coordination – Carlos Gaytan

The meeting was called to order at 4:45 PM. Introductions were made. The names of the members were projected on the screen. By a show of hands the quorum was reached by having 18 of the 34 members present.

The minutes of the fall 2012 meeting in Milwaukee were presented. Ali Ghafourian moved to approve them as written. Said Hachichi seconded. Under discussion, Tom Holifield mentioned that he thought the note that a 7 psig PRV would activate more often than a 10 psig PRV was not what the group agreed on, and felt that the 7 psig would effectively operate the same amount of times as a 10 psig PRV. After some discussion, the group agreed to proceed with the minutes without resolving this issue at this time provided it would be addressed if necessary during development of the standard. The motion was then voted on and approved unanimously.

Then the minutes of the spring 2013 meeting in Munich were presented. Steve Shull moved to approve them as written. Ron Stahara seconded. It was approved unanimously.

The topics reviewed at the last meeting in Munich were presented.

There was discussion about considerations for negative pressures (vacuum), and tank integrity; the group was in favor of the idea of including negative pressure requirements but requested to present more references before proceeding.

Discussed installation of PRDs. Since the scope of this standard covers all distribution transformers, the requirement for PRDs and transformer kVA and BIL was clarified. A comment was made that a PRD is not necessary a valve.

On the sudden pressure relay section, Josh Herz mentioned that this device can be not only mechanical but also electronic.

The group agreed that Venting Pressure is the desired term when talking about pressure relief, and that specific definitions of this term as well as re-sealing pressure are not needed in the document.

The group was in favor of the idea of including the definitions for Static and Dynamic pressure in the document, but the term static pressure was not acceptable as written and will need to be re-visited when editing the draft.

There was discussion of potential redundancies between this standard and the other distribution transformer standards. The group at the end agreed that having all the requirements related with tank pressure and the associated components in one document would be beneficial, and as the other distribution standards would be updated, any redundancies would be resolved.

Alan Wilks made a motion to: Put all the items together into a draft version of the document and circulate the draft for comments. This was seconded by Ali Ghafourian. It was approved unanimously.

The Meeting was adjourned at 6:00 pm

- C57.12.35 – Distribution Transformer Bar Coding

The WG met on Tuesday, October 22, 2013 at 9:30 am in the Majestic Room of the Renaissance Hotel in St. Louis, MO.

An agenda was presented and approved. Introductions were made. There was a quorum present at the meeting. Ron Stahara made a motion to approve the Meeting Minutes from the Milwaukee, WI meeting. Ali Ghafourian seconded the motion and the minutes were unanimously approved. Ron Stahara made a motion to approve the Meeting Minutes from the Munich, Germany meeting. Steve Shull seconded the motion and the minutes were unanimously approved.

The final draft of the document has been balloted and received a 100% approval vote. The revised standard has been approved by REVCOM and published by IEEE.

The Chair informed the WG that the Manufacturer/repair facility identification code section was moved from the informative Annex A to the IEEE website with a link from a footnote in the document. This change was made as a result of comments received from IEEE editorial during the Mandatory Editorial Coordination. A discussion on this change ensued within the WG and a motion was made to petition IEEE to move the Manufacturer/repair facility identification codes back into the standard as normative. The motion was made by Alan Wilks and seconded by Steve Shull. The motion was approved

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unanimously. Erin Spiewak from IEEE attended the WG meeting and will review with IEEE editorial and advise the chairman how to proceed if this change can be accomplished.

Meeting adjourned at 10:45 am.

- TF – Transformer Efficiency and Loss Evaluation (DOE)

The Task Force on DOE Energy Efficiency of Transformers was called to order at 1:45 PM on October 23rd, 2012. The secretary was introduced. The guest speaker Mr. Paul Jarman the IEC TC14 Chairman, was introduced

The chairman reviewed briefly the contents of the March 19th, 2013, meeting in Munich, Germany. A motion was made and seconded to approve the minutes; the motion was approved.

The chairman remarked that this will be the last meeting of the IEEE Task Force as the DOE has issued its final rule. He mentioned that this meeting will include a presentation from the IEC TC14 chairman on a proposed new CENELEC standard for energy efficiency for large transformers based on a draft of a new European Regulation. He also mentioned that he received a proposal from one of the Working Group Convenors for IEC TC14 for a possible new IEC standard on energy efficiency for large transformers beyond 100 MVA. It was shared with NEMA staff and discussed during the NEMA transformer meetings that occurred on Sunday Oct 20th, 2013. The NEMA section agreed to look at this proposal and respond back within 30 days on their decision. Depending on the outcome, there may be future work with a combined IEEE/NEMA task force to address this.

The chairman walked thru a power point slides presentation that summarized the following: a summary of the final rule, definitions in the final rule, the liquid filled final rule, the low-voltage final rule, the medium-voltage dry final rule, life cycle cost and paybacks in the final rule, assumptions, considerations in the final rule, cautions (by utilities, manufacturers, and core steel makers), key issues to establishing new standards, and reference materials. He remarked that the entire presentation has been posted on the IEEE website.

Mr. Jarman gave a presentation on a proposed CENELEC standard for energy efficiency of large transformers up to 100MVA. In addition to no load & load losses, and power factor efficiency, energy performance is calculated via a Peak Efficiency Index (PEI). PEI is based on the transmitted apparent power of the transformer. He then briefly went thru the proposed European Regulation, and then went thru some slides that spoke to the need for using PEI to calculate energy performance.

The chairman remarked again that he has received a proposal from an IEC TC14 Working Group Convenor to for a proposed new IEC standard on energy efficiency for large transformers beyond 100 MVA that will be shared with the NEMA transformer section. Depending on the outcome, there may be future work with a combined IEEE/NEMA task force to address this.

John Caskey from NEMA gave some final remarks on the DOE negotiate rulemaking process. There were many members of the working group who stepped forward with needed technical data that helped discover DOE errors. The end result was more palatable to NEMA manufacturers.

Members expressed concerns that small transformer manufacturers may no longer be able to compete in the market once the new rule goes into effect. Also depending on future DOE proposed efficiency regulations this group may need to start activities again sooner in the process perhaps as a combined IEEE/NEMA task force.

The chairman thanked all members for their work, and recommended that this task force disband. There are no future meetings planned.

The meeting was adjourned at 4:00 PM

Old Business:

- After some discussion with the C57.12.20 working group, it was discovered that there was an initiative to include bushing requirements in their standard. However after some discussion it was recommended that we bring this to the Bushing Subcommittee for consideration. Steve Shull discussed this with the Bushings Sub-Committee Chair with a suggested title and scope was follows:

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IEEE C57.19.02 Standard Performance Characteristics and Dimensions for Outdoor Distribution Apparatus Bushings

Suggested Scope:

This standard covers electrical, dimensional, and related requirements for outdoor power apparatus bushings that have basic impulse insulation levels (BILs) of less than 95kV. It provides specific values for dimensional and related requirements that are to be interpreted, measured, or tested in accordance with IEEE Std C57.19.00. Bushings covered by this standard are intended for use as components of oil-filled transformers.

Barry Beaster & Josh Verdell went to the Bushings SC at Steve Shull's request to present our case for this TF.

Chairman's Comments:

- Steve reviewed the membership requirements of TF/WG/SC of the Transformer Committee. This is listed below.
 - Membership is automatically granted to anyone requesting it at the first meeting of a new WG or TF.
 - Thereafter, membership is granted after a prospective member attends two consecutive meetings as a guest AND actively participates in the work of the TF/WG/SC. A former member may be reinstated if the same criterion is met.
 - Ongoing membership is maintained by consistent attendance at TF/WG/SC meetings, participation in internal TF/WG/SC surveys, or technical/editorial contribution to the TF/WG/SC's document or work.
 - Membership may be revoked if a member fails to attend two consecutive meetings or fails to respond to two consecutive surveys. The chair has discretion in not removing members who cannot attend but are still participating via survey responses and/or other written contributions.
 - **Another key point that was mentioned is that each TF/WG/SC Chair (or Secretary) must keep regular logs of attendance and participation and update the roster after each meeting. This is done in our Transformer Committee AM system. This should be used to determine our Quorum requirement for TF/WG/SC meeting business.**
 - **The main benefit of membership is the privilege of voting on TF/WG/SC issues.**

New Business:

Phil Hopkinson brought two items to the SC for discussion:

- ◆ Phil has found that transformers used in wind farms are experiencing gassing from what appear to be core static discharges. It appears these are occurring from round wound L-H designs and it is not dependent on manufacturer. It also to more prevalent as the high side voltage increases. There are a number of options to correct the issue and the desire isn't to standardize a design requirement, but to address the issue and recommend solutions. These include low-high-low configuration and shielding between core and winding or around HV windings. Motion was made by Phil Hopkinson and seconded by Ron Stahara for the SC to form a TF to study this phenomenon and make recommendations to address this issue. This could include recommendations to alter the some of the standards. After some discussion Dan Sauer called the question and the SC approved the motion without opposition.

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- ◆ Phil has also found transformer failures resulting from vacuum or SF6 breaker switching with shielded cables and high inductive loads. Phil suggested this go into a standard. Steve Shull said this will have to go before the proper Subcommittee. Unfortunately this would not be this Subcommittee. Steve Shull suggested that it should be brought before the Performance Characteristic Subcommittee.

Steve adjourned the meeting with unanimous consent at 10:32am.