

**Performance Characteristics Subcommittee
Unapproved Meeting Minutes – San Diego, California – April 13, 2011**

10.7 Performance Characteristics Subcommittee – Stephen Antosz, Chairman; Ed teNyenhuis, Vice-Chair; Craig Stiegemeier, Secretary

Introduction / Attendance

The Performance Characteristics Subcommittee (PCS) met on Wednesday, April 13, 2011 at 3pm with 56 members present at the start of the meeting. Prior to this meeting, the total membership of PCS was 87 members; therefore with 56 present, we did have in excess of 50% of the membership, meeting the requirements for a quorum.

Chairman's Remarks

Administrative Subcommittee Notes

a) Upcoming IEEE – PES Meetings

- PES General Meeting: July 2011, Detroit, Michigan.
- PES General Meeting: July 2012, San Diego, California.
- Next Transformer Committee meeting: Fall 2011, October 30-November 3, Boston, MA; Renaissance Boston Waterfront Hotel; hosted by Charles and Mary Ann Sweetser and Omicron USA

b) New Program Manager from IEEE for Transformers Committee:

- Matt Ceglia has moved on to a new position. His temporary replacement is Erin Spiewak, e.spiewak@ieee.org, 732-465-7806.

Git 'er done

A frequent complaint we all have of our IEEE activities is that the work drags on for years and years. I doubt if many people disagree with this. So I want to encourage all PCS WG & TF Chairs (Members, and Guests) to:

- Avoid scope creep, by consciously considering why the group is formed, what is our objective, timetable, etc. Take a moment at future meetings to add to the agenda a review of the scope of your WG/TF to make sure you are on track to complete. There are many other good projects in the pipeline that we could move on to. Don't be afraid to finish.
- Promote efficiency by better time management at the meetings and in between meetings. Push a little harder to make group decisions quickly.

General Comments

The chair requested that all chairs and coordinators send reports to the PCS officers for incorporation into the meeting minutes.

Approval of Meeting Minutes

The minutes of the last meeting in Toronto, Ontario, Canada were approved as written.

Working Group (WG) and Task Force (TF) Reports

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10.7.1 WG on Loss Evaluation Guide C57.120 – Don Duckett, Chair; Alan Traut, Vice-Chair

PAR Status: PAR Approved

PAR expiration Date: 12/31/2014

Current Draft Being Worked On: None

The meeting was called to order at 11am on Tuesday April 12, 2011.

Attendance of membership was taken. Attendance: 54 total; 18 of 27 Members present, establishing a quorum. 34 Guests, of which 2 requested membership

The minutes of the Fall 2010 Toronto meeting were approved as submitted. A request was made for disclosure of any patents that may be related to the work of the WG, and there were no responses to the request for disclosure.

The WG began a review of PC57.12.33/D9 which will be used as the basis for the first draft of the revised loss evaluation guide. Clause 4 covers the basic formulae used to calculate the loss evaluation A and B factors for utility users. We decided to include cost of emissions in the capacity and energy cost determinations. We will also include a discussion of the uncertainty in the assumptions used to determine A and B factors and the means to address the uncertainty, ie, Band of Equivalence (BOE) and Monte Carlo simulations.

The chair also reported on the Department of Energy (DOE) work on evaluating revised efficiency levels for distribution transformers. This material will be made available to the WG and considered at the next meeting.

There was no other new business.

The WG adjourned at 12:15 pm and will need a meeting slot at the Fall 2011 Boston meeting.

10.7.2 PCS WG on “Test Code C57.12.90” – Mark Perkins, Chairman; Craig Stiegemeier, Secretary

This working group met on Monday, April 11, 2011 at 9:30am in the Kon Tiki Room

1. Kirk Robbins has requested that someone else take over the WG Secretary duties. Craig Stiegemeier agreed to become the WG Secretary.
2. Introduction of members and guests
3. Membership quorum – 44 of 83 members of were in attendance, adequate to qualify the meeting for conducting official business. Membership rosters were circulated. After review and addition of 20 people requesting membership, the Working Group now numbers 103 members, of which 54 attended the meeting. There were also 61 guests at the meeting.
4. Patents – no one identified any patent issues.
5. Approval of minutes of the Fall 2010 Meeting in Toronto
 - Motion and second, minutes approved unanimously
6. Old Business
 - A suggestion for subtractive and additive polarity in Section 6.1 was reviewed. Steve Antosz provided suggested diagrams presented as Figures 2-5, which were reviewed with the attendees. No comments were made, and the Chair announced that these figures would be used.

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- Section 6.2, Polarity tests for single phase transformers was reviewed. Ratio meter is listed first as the most common method. The inductive kick and alternating voltage methods were reviewed and included as sections 6.2.2 and 6.2.3, respectively.
- The Chair covered Section 6.3, which describes the Polarity and phase-relation test methods for polyphase transformers. Figures 7 and 8 were reviewed and noted unchanged from the current standard.
- Section 7, Ratio tests was reviewed. It was noted that outdated methods have been removed and the wording simplified. The voltage and frequency for the ratio test in 7.1.2 was clarified to reflect the use of available power frequency for the ratio test. The wording in section 7.1.3 and 7.1.4 was reviewed. The method for testing transformers with inaccessible neutrals in 7.1.4 and covered in Figure 9 was reviewed and discussed. It was suggested that words be added to the notes in Figure 9 to clearly state which terminals should be shorted. The majority of the members thought adding “short H1-H3” and “short H1-H2” should be added to the notes in Figure 9. The motion passed 33-0.
- Section 7.3, Ratio test methods (voltmeter and transformer ratio meter) were reviewed. The current standard limits the method to transformers with ratios of 30 or less. Since there was no alternate method for transformers with a ratio greater than 30 and the method works, this limitation has been removed.
- The working group made a motion and voted to continue and survey to the PCS Subcommittee with the changes as reviewed today. The motion passed 41-0.

7. New Business

- A question on the status of Clause 12. It has successfully passed a survey and is waiting for total review with the balance of the C57.12.90 document.
- The portions of C57.12.90 that fall under PCS are in good condition. Clauses 8 and 9 (no load and load loss/impedance) are possible topics for review at the Fall 2011 meeting in Boston.

8. Motion for and unanimous agreement for adjournment at 10:20am.

10.7.3 PCS TF on Dielectric Frequency Response – George Frimpong, Chairman; Poorvi Patel, Secretary

This was the first meeting of this TF; which will review the current existing practices for DFR to see if there is a need to develop a paper, guide, or standard. TF has been challenged to complete its work in 3 meetings or less, and the TF Chair has accepted this timeframe. The TF met on Monday, April 11, 2011. The meeting was called to order by the chair at 3:15 PM. There were a total of 51 attendees; 22 requested membership and 29 guests.

1. Introduction of members and guests
2. The IEEE Patent disclosure requirements were discussed and a request was made for disclosure of any patents that may be related to the work of the TF.
 - a) Mark Perkins indicated that ABB has a patent that may be applicable. The chair will send the requisite form to ABB to secure a Letter of Assurance.
3. The scope of the task force as described by the PCS chair was presented, as follows:
 - a) Review existing practices of Dielectric Frequency Response measurement techniques, to determine:

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- if the technique has technical merit
 - if the technique is proven and commercially available
 - if the technique IS (not "can be", but "is" already) a practical useful tool for the industry
- b) Review the relationship of DFR measurements to existing projects or Standards. (such as Annex G of PC57.152 D4.1)
- c) Determine whether sufficient interest and resources exist to develop an IEEE tutorial, paper, or guide.
- d) Prepare a report to the PCS chairman to address these issues, summarize the findings, and make recommendations on a course of action.
- e) If a further project is suggested, then define the intended Title, Scope, and Purpose for the PAR.
- f) The TF has 3 meetings to complete its work and present its findings to the PCS chair.
- There was discussion about the scope but no changes were suggested or made. Mark Perkins indicated that the DFR presentation given at the Lombard meeting in Fall 2009 addresses all three items in item (a) of the scope. The material in that presentation will be incorporated into the task force report. The presentation is available on the transformers committee website.
4. In an effort to speed up the work of the task force, four groups were created to handle various aspects of the scope. These groups will work via teleconferences in-between scheduled committee meetings.

Task	Volunteer Assignments
1. Generate a comprehensive bibliography of published materials on <u>theory</u> and <u>application</u> of DFR (scope #1)	George Frimpong Sanjib Som Ali Naderian
2. Provide a simple description of DFR methodology (scope #1a)	Peter Werelius Mary Foster
3. -Collect and study test procedures and data generated from application of the method in the field and factory (scope #1b) -Validate the DFR technique (scope #1b) -Qualify DFR measurement outputs and quantify their diagnostic value (scope #1c)	Mahendra Soni Diego Robalino Mark Perkins Poorvi Patel Tom Prevost Chuck Sweetser Leopoldo Rodriguez
4. Review existing transformer diagnostic guides and standards (e.g. annex to PC57.152.D4.1) and define relationship to DFR measurements (scope #2)	Peter Werelius Mario Locarno
5. Determine interest and available resources in developing tutorial, paper or guide	All
6. Prepare report to PCS chair addressing identified issues	All

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5. Charles Sweetser asked that the TF consider not only the successes of the DFR technique, but also the cases where it failed to give a diagnosis. In addition, Steve Antosz implored the TF to consider both the pros and cons of the DFR method.
6. The chair set the following time table for completing the work of the task force:
 - a) Spring 2011
 - agree on scope and tasks
 - task assignments
 - b) Fall 2011
 - first drafts/reports of tasks (#1 - #4)
 - c) Spring 2012
 - final draft review and obtain comments
 - d) After Spring 2012 Meeting
 - submit report to PCS Chair
7. Since many of the attendees were not present at the DFR tutorial during the Lombard meeting, Jim McBride suggested the tutorial be repeated for their benefit. The highlights of the tutorial were presented by the original presenters.
8. The meeting was adjourned at 4:30 PM.

10.7.4 PCS WG on “General Requirements C57.12.00” – Steve Snyder, Chairman; Enrique Betancourt, Secretary

The Working Group met at 3:15 PM on Monday, April 11, 2011 with 33 members and 57 guests present. As the current Working Group membership stands at 58 members, we did have a quorum at the meeting. The following (14) guests requested membership, that will become effective only after confirmation of attendance to two (2) consecutive meetings:

Alexander Chesnakov	Delta Star
Javier Arteaga	ABB South Boston
James Graham	Pike Energy
David Harris	Waukesha Electric
David Murray	TVA
Dwight Parkinson	Cooper Power Systems
Hakan Sahin	ABB
Jagdish Bunde	Virginia Transformer
Jill Smith	Bureau of Reclamation
Myron Bell	Delta Star
Raj Ahuja	Waukesha Electric
Roberto Assano	ABB
Shankar Nambi	Bechtel
Stephen Jordan	TVA

Following introductions, the minutes of the October 25 Toronto meeting were approved.

Working Group members were then asked if anyone was aware of any applicable patent activity that might impact our work. No patent issues were disclosed by anyone.

The meeting agenda was presented and approved.

The meeting began with **Old Business**, WG item 82 :

WG Item 82, Clause 7.1.4.4 Stabilizing Windings

Addresses an issue raised in an earlier ballot of standard C57.12.00 which requested :

- (a) Recommendations for guidelines to determine MVA rating of buried tertiary windings,
- (b) To define the conditions under which this MVA is applicable, and
- (c) Determine the tests or calculations necessary to prove the tertiary MVA rating.

The chairman of the Task Force (Enrique Betancourt) that was formed to address the subject gave the Working Group an update on the status of the TF work. The TF has now agreed to a specific clause for insertion into standard C57.12.00, as follows :

5.11.1.2 Thermal Rating for Stabilizing Windings

“In addition to the short circuit duty (see 7.1.4.4), stabilizing windings shall be designed to withstand the transient and continuous thermal duty specified by the user, to allow verification of compliance with maximum allowable temperatures according to the present standard.

In the event no continuous thermal duty for the stabilizing winding can be established from the user's specification, the manufacturer shall design the stabilizing winding considering the circulating current in that winding, resulting from a full single phase load in the largest main secondary winding (for more than one secondary winding). The manufacturer is to determine the stabilizing winding MVA rating based on the transformer's or autotransformer's equivalent circuit for single phase loading condition.

The manufacturer is to calculate values of hotspot and average temperatures for the stabilizing winding to verify compliance with allowable temperatures. Initial conditions for those calculations will be considered as the transformer or autotransformer operating at its maximum continuous rating, before switching to the loading conditions described in the first or second paragraph of this clause, whichever applicable.”

This new clause on thermal performance of stabilizing windings will be sent for a survey within the Performance Characteristics and Insulation Life Subcommittees. Once accepted, the work of this task force will be completed. However, there has been strong interest among the attendees at these meetings to continue working on the general topic of tertiary and stabilizing windings. A show-of-hands among the task force attendees showed 28 individuals interested in participating in the development of an Application Guide for Tertiary and Stabilizing Windings. A Title, Scope and Purpose have already been developed, and were presented to the task force meeting attendees and found adequate to start the process of a new Working Group, if approved.

WG Item 87, Table 18 Short-circuit apparent power of the system

This item is based on a comment (negative ballot from 2006) that the system short circuit current levels listed in Table 18 are unrealistically high, leading to designs that may be uneconomical. The suggestion was to limit these assumed fault current levels to 63 kA and lower.

A task force to focus on this topic, chaired by Bruce Forsyth, was formed at the Toronto meeting. Bruce reported at this meeting that the TF held a web-based meeting on February 24 for the purpose of reviewing and, if necessary, updating the values in Table 18 to ensure they are reasonable given current industry practice. The TF also planned to hold an off-schedule meeting on April 12 to review action items from the February 24th meeting and to consider any further action required.

WG Item 92, Add to Nameplate, Oil Volumes from 25C and 65C to Low Alarm

A request was received from the 2009 ballot of standard C57.12.00 to change the nameplate information concerning liquid volumes. The comment was that there is an interest in knowing how much oil would be spilled before the liquid level gauge would reach the low level and alarm. Suggest adding liquid level volumes from 25°C and 65°C levels to low oil alarm.

Since the previous meeting, the chairman of the WG contacted M. Thaden, who explained that the information is useful, but not critical. The floor was open for discussion or further comments, with no support for adding this information. The subject was dropped and this item is considered closed.

WG Item 89, Reference Temperature in C57.12.00/D2C –/2008 Sections 5.9, 7.4, 8.4, 8.7

Requested Change : The term “reference temperature” appears eight times with five different definitions (in standard C57.12.00). The request is to define the two terms “Core Reference Temperature” and “Reference Temperature” in C57.12.80 and then modify the standards which refer to those definitions accordingly. For C57.12.00 it would be the sections cited above.

Section 5.9, Total Losses, suggested change accepted by the WG : “The standard reference temperature for the load losses of power and distribution transformers shall be defined as 20 °C plus the rated average winding rise.”

Section 7.4 (calculation of winding temperatures during short circuit), no changes deemed necessary. Present statement is “Tr is the reference temperature defined as 20°C ambient plus the rated average winding rise.”

Section 8.4 (determination of transformer regulation), suggested change accepted by the WG : “Regulation calculations shall be based on a reference temperature defined as 20°C plus the rated average winding rise.”

Section 8.7 (certified test data), note 3, suggested change accepted by the WG : “All temperature sensitive data shall be reported after correcting to the reference temperature as defined by IEEE Std. C57.12.80 and section 5.9 of this standard.”

The Working Group then began discussions on **New Business**, as follows :

WG Item 93, C57.12.00 -2010 Section 4.3.3 Other unusual service conditions, note q)

Requested Change: Parallel operation is quite a common practice. Review the clause by saying that this is a normal practice and that the user shall advise the manufacturer if this is effectively the case.

After reviewing and discussing the existing clause, the WG determined it to be accurate as is, so no changes will be made.

WG Item 95, C57.12.00 - 2010 Section 5.1, Table 2, Cooling class designation

Requested Change : This data has been in the last two revisions and should not be needed in the main body any longer. Move lines 7, 8, 9 and Table 2 to the annex.

After discussing the request, with 27 members in favor and two opposed, the Working Group decided to move Table 2 to the annex, with appropriate wording in the main body of the standard referring to that annex.

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WG Item 95, C57.12.00-2010, Section 5.5.3 Ratings of transformer taps

Requested Change : Change the definition of reduced capacity to match C57.12.10.

The Working Group reviewed the clauses from both C57.12.10 and C57.12.00. As part of the discussion, it was pointed out that in both documents it is implicit that the reduced capacity on-load taps would be located only on the LV side. After a lengthy discussion, the WG made the decision to leave the text in C57.12.00 as it is, with 28 members in favor and none opposed.

The meeting was adjourned at 4:30 PM.

10.7.5 WG on “IEEE Standard Requirements, Terminology, and Test Procedures for Neutral Grounding Devices”, PC57.32 – Steve Schappell, Chairman; Peter Balma, Vice-Chair

The Neutral Grounding Devices working group was called to order at 8:00 AM on April 12, 2011. There were 31 attendees: 13 members and 13 guests, with 1 requesting membership. Copies of the previous meeting minutes were distributed. The WG is up against a wall. The Std expires at the end of this year AND the WG's PAR expires at the end of the year. The WG is on a fast track to get the document out for ballot within the next couple months, and the people in attendance responded in kind with acceptance of several volunteer assignments.

1. Introductions were made, and the IEEE patent policy was reviewed. The group was asked if there were any patent disclosures, none were indicated.
2. The agenda for the meeting was reviewed and it was determined that a quorum was present. The committee roster has been reviewed to maintain the voting member list, and it was indicated that the working group chair should be contacted for any concerns relative to membership.
3. The minutes from the Toronto, Canada meeting on October 26, 2011, were approved without comment.
4. The PAR for the working group is valid until the end of 2011; therefore, it is critical for the standard to be balloted as soon as possible.
5. The Performance Characteristics Subcommittee Chair, Stephen Antosz, joined the meeting and encouraged the working group to get this standard into the balloting process. Further, he offered to assist the group in any way he can, and he stressed that the PAR would expire at the end of the year.
6. The working group then proceeded to review comments and input received from working group members and guests since the last meeting.
 - It was suggested to add an additional clause or paragraph to the reactor section of the document to provide information on the application of grounding reactors when located on the cover of transformer tanks. The working group agreed.
 - It was then pointed out that the terms grounding transformer and neutral grounding transformer were both used in the standard, but were not clearly defined and differentiated. The working group accepted that this should be reviewed, and recommended that a reference to C57.12.80 may help to clarify the terms.
 - Several questions on test values for dielectric testing, as well as low frequency tests for grounding transformers were discussed. The section of the standard applying to transformers is still being revised, and the group concurred that the information was

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needed and will be included. This topic was revisited later in the meeting, where it was decided that the test values would be provided for dry type transformers up to 34.5 kV, and for oil filled transformers up to 230 kV. It was also decided that multiple BIL levels for a given system voltage would be included as is done in C57.12.00. Devki Sharma agreed to construct a table for these transformers.

- Next, the coefficient of resistivity for grounding resistors was reviewed. (Peter Balma, vice chair, recused himself from the vice chair position for this portion of the meeting, to join the discussion as a working group member). This topic and background information from other related standards (UL-1676, TIL-D-31, and PIPELSGS11) was presented. In addition, consideration was given to suggesting limits and or guidance on the coefficient of resistivity. It was suggested that it would be beneficial to have some information on this topic for users of the standard, and that perhaps an informative annex could be added for this purpose. Sergio Panetta agreed to revise the resistor section, and to consider an informative annex.
7. The working group then reviewed the remaining areas of the draft to be completed.
- Definition 3.6 is focused on reactors and does not apply for all devices, and needs to be revised. Peter Balma and Richard Dudley volunteered to do this.
 - A final check has to be made that all 4-second ratings references have been removed from the document.
 - Table 9 and 10 (Draft 9) provide guidance on the limiting temperatures for current carrying parts of neutral grounding devices. After discussion of these by the group, it was decided that these tables would be revised to reflect transformers only and would be based on 55°C rise as in the original document. Sheldon Kennedy agreed to revise the tables.
 - The text of Clause 8, Tests, has to be reviewed for consistency with the remainder of the document. The clause was originally structured around a common dielectric test table; however, this table has now been split into sections within the clause for each type of neutral grounding device.
 - It was agreed that the dielectric test values for combination devices should be based on the values of the component with the highest requirements. The clause will be revised to reflect this.
8. All members of the group were requested to provide their input as soon as possible, but no later than 3 to 4 weeks from the date of this meeting.
9. The plan is hold web conferences once a week to assemble and review all the input and changes required. Volunteers for the calls were requested, but it was decided to send the e-meeting notices to all members and those in attendance at this meeting.

The meeting adjourned at 9:17 am.

10.7.6 TF on “Semi-Conductor Rectifier Transformers”, C57.18.10 – Sheldon P. Kennedy, Chairman

The Working Group met on Tuesday, April 12, 2011 at 3:15 PM with 10 members and 2 guests present. There were 4 new members added to the Task Force. Sheldon Kennedy chaired the meeting. We did not have a quorum.

The IEEE disclosure statement was discussed. There were no patents pertaining to this standards work for which any members had awareness, although, we did discuss the

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previously noted patents on phase shifted windings. We had already decided to avoid showing any particular winding arrangements for multi-pulse transformers.

The minutes of the October 26, 2010 meeting in Toronto, Ontario were read but could not be approved due to the lack of a quorum.

The chair made a proposal for a clause on electrostatic ground shields. The Task Force proceeded to make revisions to the discussion of the electrostatic ground shield. Information was added to require it to be shown on the nameplate if it is included in the design. Also, notes about possibly higher insulation power factor test values and dielectric frequency response test values were also added.

Phase shifted secondary windings with multi-pulse secondary windings such as 18 pulse, 24 pulse, 36 pulse, 48 pulse and 54 pulse are becoming a great part of the motor drive transformer applications, as well as higher current rectifier transformers. There is no discussion about these in the present C57.18.10 and this will need some work. We began to discuss how we would incorporate these circuits into C57.18.10 since this is all relatively new work since the document was originally published in 1998. Numerating additional rectifier and transformer circuits was discussed. At our meeting in Lombard, Dhru Patel informed us that there were patents on a lot of the methods of phase shifting windings by the drive and rectifier companies. Not wishing to have a problem with patents, the Task Force decided to just propose general discussions of phase shifting windings and not give any of the exact phase shifts that are being used in industry. This seemed the best way to accomplish this. The Chair submitted a proposal of a general discussion of the topic for the Task Force to consider. It was well received but could use some additional comments by members. Members will give comments to the chair by the next meeting.

There was a discussion about the standards being written in the Vehicular Transportation Society of IEEE. A traction rectifier transformer standard, rectifier standard and many C37 switchgear standards are being revised by this organization with emphasis on the needs of the transit and rail industry. Concerns about duplication of standards and conflicts in the standards were raised. This standard has been reintroduced and a balloting group was being formed.

The chair announced that the IEC Converter Transformers for Industrial Applications IEC 61378-1 standard is under revision again. The chair discussed some of the highlights of their latest draft. This has now proceeded to an FDIS in IEC. We will ask IEEE to request a copy of their work for harmonization with our document. To date, I have not been able to get approval to share the information. The Chair will again discuss this with IEEE staff and may be able to get this before the next meeting.

The Task Force will look at the tables of circuits at the next meeting and discuss how we might go about revising these according to the new IEEE format.

There were no further comments.

The meeting ended at 4:30 PM.

10.7.7 TF on “Audible Sound Revision to Clause 13”, C57.12.90 – Ramsis Girgis, Chairman

The TF met at 11:00 am on Monday, April 11, 2011 with a total of 83 in attendance, 19 members and 64 guests, 5 guests requested membership of the TF. This is a record attendance for this TF; which is very encouraging. This will allow a greater exposure of members of the Standards committee to the workings of this TF; which should help in the process of balloting the revised Clause 13 of C57.12.90.

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First, the minutes of the Toronto meeting were approved as written.

The chairman then announced that this was the first meeting of the TF under the PCS SC. For a number of meetings, this TF was under the ASV SC. He also informed that the Noise measurement Standard in IEEE C57.12.90 and the IEC 60076 – 10 Standard are presently being revised in parallel. Every effort is being made by the chairmen of this TF and the IEC WG to harmonize the two Standards.

The 1st item discussed was the appropriate conditions for accurate measurement of transformer noise using the “Sound Intensity Method”. The chairman reported that the IEC WG included in its most recent draft conditions that are mathematically equivalent to those which the IEEE TF suggested and agreed to. However, the chairman suggested that the correction should conceptually be applied to the measured Intensity level not the Pressure level. The chairman will resolve this item with the chairman of the IEC WG.

The 2nd item discussed was measuring Load Noise. The TF previously agreed to include in C57.12.90 Load Noise testing upon customer’s request and not use the condition stated in the IEC Standard for measuring Load Noise because of the inaccuracy associated with the formula used in the Standard to calculate Load Noise. In spite of bringing this up to the attention of the IEC WG, the latest draft of the IEC Standard still includes that condition. The chair will try again to convince the IEC WG of the inadequacy of using that condition.

Next item discussed was the correction for sound wall reflections. The IEEE TF has decided to introduce this correction to the “Sound Pressure Method” but limit its value to 4 dB. The latest draft of the IEC Standard still includes a limit of 7 dB but added a note that if the correction is > 4.1 dB, the correction would need to be determined by measurements.

Next item discussed was the wall Absorption coefficient. The IEEE TF has suggested using only 3 or 4 values instead of the 7 values used in the present IEC Standard. Data demonstrated that the magnitude of error associated with this simplification is only a fraction of a dB. The latest draft of the IEC Standard includes 5 values with different definitions of the environment corresponding to these values. The chairman of this TF intends to work out an agreement with the chairman of the IEC WG on optimum values of this coefficient and definitions that are more descriptive of the environment of the test area.

Next item discussed was the sound measuring contour. Originally, the IEEE TF suggested a 1 m contour all around in order to minimize the near – field effect as well as the contribution of ambient noise. The latest draft of the IEC Standard includes a 1/3 m contour for distribution size transformers and 2 m uniform contour as a standard, except in cases of test room dimension limitations or low signal – to – noise ratio in case of low noise transformers or high background noise. This will apply whether it is ONAN or ONAF. The IEEE TF will keep the 1/3 m contour for ONAN. For ONAF, the TF voted to use a uniform 2 m contour whenever noise testing is performed with the cooling equipment running. This will replace the present practice of having the contour at 2 m from the fans when they are running and 1/3 m for the rest of the transformer surface.

The last item discussed was the calculation of the sound radiating surface area used to calculate sound power. The IEEE Standard equation has a 1.25 multiplier of the vertical sound radiating surface. This multiplier accounts for the sound radiating from the transformer cover. The latest draft of the IEC Standard has an equation where the distance between the measuring contour and the transformer; whether it is 1/3 m or 2 m, is added to the height of the transformer. For a medium size transformer of about 3 m height, when measuring the ONAF noise level, the IEC calculation translates into a 1.66 multiplier instead of the 1.25 IEEE multiplier; resulting in a 1.2 dB high sound power level. Since the IEEE

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equation is more representative of the physics of the sound radiation and sound measurement, the IEEE TF will keep the equation used presently in C57.12.90.

The plan is to present a first Draft of revised Clause 13 of C57.12.90 at the Boston meeting.

Subsequent to the meeting, Barry Beaster offered to serve as the Secretary of the TF. The Chair thanks him for his offer.

10.7.8 TF on Transformers Directly Connected to Wind Turbines – David Buckmaster, Chairman; Vice Chair: Phil Hopkinson; Secretary: Scott Choinski

The Task Force on Wind Power Transformers was called to order at 9:30 AM on April 12. There were 106 attendees, 23 members, 83 guests with 19 requesting membership. A survey of members present was conducted and showed 18 members were present, which is not a quorum. Another survey was conducted which showed 8 requested membership at the last meeting and would become members after this meeting. There were no patents to disclose. The minutes from the meeting held October 26, 2010, was accepted as written.

1. Announcement for transition to a Working Group

This TF has been moved to the Performance Characteristics SC.

The TF will disband and become a WG at the fall meeting. Membership on the WG would be reset to those attending the first meeting. Membership requirements would be to attend 1 meeting per year, and missing 2 meetings in a row is grounds for removal as a member. Chair can exercise discretion in granting waivers for certain circumstances.

This group was designated as a TF to explore developing a PAR, and all attending the meeting were granted membership.

2. Status of IEC 60076-16

The IEC WG met in late November to review document and consider the IEEE comments submitted. The document has not yet been circulated as FDIS yet and is expected at any time.

3. Discussion to develop PAR

Motion: Make the document a standard

Approved with none opposed

The TF approved the following Title:

Standard requirements for Wind Turbine Generator Transformers [DEB – Corrected 04/13/11]

The TF approved the following Scope:

This standard establishes requirements for Liquid Immersed, or Dry Type transformers with at least one set of terminals rated ≤ 38 kV with a capacity rating ≤ 100000 kVA suitable for Step-Up operation to be used to transform the voltage from the Wind Turbine generator to the system voltage of the collector grid.

The TF approved the following Purpose

The purpose of this standard is to enable manufacturers and users in specifying, designing, and manufacturing transformers used for Wind Turbine Generator duty.

4. New Business -- None

**Performance Characteristics Subcommittee
Unapproved Meeting Minutes – San Diego, California – April 13, 2011**

Next in person meeting will be at the Fall IEEE Transformer Committee meetings in San Diego. The meeting adjourned at 10:42 AM.

Reported by: Scott Choinski, April 13, 2011

Approved as noted by: David E. Buckmaster April 13, 2011

10.7.9 WG - Status of PC57.142, “Switching Transients Induced by Transformer / Breaker Interaction”, – Robert Degeneff, Chairman; Bill Griesacker, Secretary

Status report presented by Stephen Antosz

1. There was no meeting of the working group this session.
2. Draft 8.3 of the guide was recirculated a sixth time between October 12 and October 22, 2010. There were 154 eligible voters. 143 voted with 129 voting affirmative, 3 negative, and 11 abstentions. 3 comments were received. This was a 98% affirmative vote. Two of the comments were editorial and the third was of a general nature that could not be addressed in this ballot cycle.
3. Draft 8.3 of the guide was submitted RevCom for its December meeting and was approved for publication.
4. The Chairman has been unofficially told that C57.142 will be sent out this week for proof reading of the final copy. The Chairman will contact a number of working group members to assist in this proof reading effort. Publication should follow by early fall.

10.7.10 Status update of “Guide for the Application and Interpretation of Frequency Response Analysis for Oil Immersed Transformers”, PC57.149 – Chairman; Charles Sweetser

The PAR has been revised and extended. Mandatory Editorial Coordination is complete. The ballot pool is being formed. The ballot should be opened in the next month or so..

10.7.11 Old Unfinished Business

None

10.7.12 New Business

Phil Hopkinson suggested that the work of the PC57.142 group as reported in 10.7.9 above be continued for higher voltage applications. The motion as proposed and seconded was to form a task force to address high frequency transient over voltages higher than medium voltages; involving bushings, transformer windings, and interactions with the system, including backfeed operation of generator step up transformers. Significant discussion ensued and the motion passed by a vote of 29 to 9.

The exact plan of implementation was not decided and requires careful consideration to make sure we get it right. The chair requested that a written detail of this proposal be provided by Phil to circulate amongst the Administrative Subcommittee for discussion and use as the basis for defining the scope and direction of a new Task Force. It was noted that this effort would require significant coordination with other transformer committee groups as well as others with broader system implications.

Meeting adjourned at 4:15pm