10.2 Distribution Transformer Subcommittee Report

Meeting Time: 3:00pm, Wednesday, April 17, 2002

Attendance: 45 Total
26 Members
17 Guests
2 Guest Requesting Membership

10.2.1 Chair's Remarks & Announcements:

Review of Administrative Committee meeting highlights

- Future Meetings.
- New Members
- "Sponsored Breaks"
- Transformer Standards Activity

10.2.2 Working Group Reports

10.2.2.1 C57.12.20 Single Phase Pole Mounted Distribution Transformers

Alan Wilks & Glenn Andersen Co Chairs
(awilks@ermco-eci.com & gwanders@duke-energy.com)

PAR Status: Submitted December 2001
PAR Expiration Date: End of 2005
Current Standard Date: 1997
Current Draft Being Worked On: #VII Dated April 2002
Meeting Time: 11:00am, Monday, April 15, 2002
Attendance: 36 Total
14 Members
22 Guests

Issues, Remarks & Announcements:

- Introductions were made and the Orlando minutes were approved.
- Alan Wilks gave a status update of our PAR. It was submitted to IEEE in December, 2001. As far as we know, it was approved and the PAR is current.
- Draft VII, dated April, 2002, was reviewed. The changes were noted on a separate handout sheet. It was agreed to leave the tolerance on Tables 8 and 9 at ±0.4 mm except to reference the tolerance as a note under the heading of "size of terminal opening" column.
- It was agreed to place a ±0.8-mm tolerance on "B" dimensions of Figure 5B – hole spacing on spade terminals. The reason was to avoid conflict with devices that bolt onto the spade.
- There was considerable discussion about using a metric only style of dimensioning and other measurements. It was pointed out that the standard is almost universally used in countries where Imperial units of measure are customary. The metric unit of measure would cause users to make conversions to Imperial units and could cause many errors in the process. The Working Group was in favor of a dual dimensioning system where both metric and imperial units of measure were shown.
- It was mentioned that C57.12.25, had been submitted with dual dimensioning and units of measure. Two enclosure integrity standards are currently out for ballot with metric units shown and imperial units in footnotes. Apparently

footnotes and informative annexes are acceptable places to show imperial units of measure.

- Glenn Andersen and Alan Wilks will issue a Draft VIII showing imperial units in footnotes or informative annexes. They will send to W.G. members for an on-line e-mail W.G. vote. We will look to Ed Smith, our S.C. chair for guidance on metrification.
- There were two items of new business.
    - Jerry Corkran had previously questioned Table 6; why is there a statement "Single Phase Transformer Bushings Only"? Does it apply to three phase? Does it only apply to 95 KV BIL or also 125 and 200 KV BIL?
    - Bikash Basu from Southern California Edison will check with Gerry Paiva to see why the extra creep bushings apply to 16340volt units only or 95 KV BIL and why 125 and 200KV BIL is listed below the "single Phase…" statement also.
- John Borst questioned the wording of paragraph 6.3.3.2 regarding labeling LV leads A, B, C & D. Glenn Andersen and Alan Wilks will suggest a reworded paragraph to clarify.
- The meeting adjourned at 12:10 PM.

10.2.2.2 C57.12.23 Single Phase Submersible Distribution Transformers

Al Traut & Roger Lee Co Chairs
(alant@keco.com & leerj@sce.com)

PAR Status: Approved 3/18/1999 (For Standard Revision)
PAR Expiration Date: N/A
Current Standard Date: 1992, Reaffirmed 1999
Current Draft Being Worked On: #IV
Meeting Time: DID NOT MEET
Attendance: N/A

Issues, Remarks & Announcements:

- The working group did not meet at the Vancouver meeting.
  Since the last meeting, draft 4 was balloted by the IEEE. Of the 63 ballots returned there were 60 affirmative, no negative and three abstentions. The editorial comments received will be included in this draft before submitting to IEEE RevCom in May. Technical comments will be tabled for future WG action.

10.2.2.3 C57.12.25 Single Phase Padmounted Distribution Transformers

Ali Ghafourian & John Lazar Co Chairs
(ali.ghafourian@us.abb.com & john.p.lazar@nspco.com)

PAR Status: Approved 12/08/1998 (For combining Standards C57.12.25 & C57.12.21)
PAR expiration Date: End of 2002
Current Standard Date: 1990
Current Draft Being Balloted: #VIII
Current Draft Being Worked on: #I Dated: April 2002
Meeting Time: 1:45pm, Monday, October 15, 2001
Attendance: 35 Total
19 Members
16 Guests

Issues, Remarks & Announcements:

- Status of C57.12.25: Has been balloted; all negative votes were resolved. Sent to IEEE October 2001. Need to submit to RevCom by May 03, 2002. Takes 3 – 9 months to get published.
- Status of combined standards ˚25 & ˚21: Draft 1 of the combined standards C57.12.25 (Dead Front) and C57.12.21 (Live Front); 10 were distributed.
- Draft Revision #: 1 C57-12-25 & C57-12-21 Draft Date: April 2002
- The W.G. voted and approved to expand the KVA range to include 10 & 15 KVA in the combined standard.
- The W.G. voted and approved to NOT include 250 KVA in the standard.
- Table 1 and Fig. 1A reviewed and discussed metrification in detail. The W.G. agreed that, in order to eliminate any confusion and mistakes in conversion between English and metric dimensions IEEE should allow dual dimensioning in our documents.
- Mr. Ed Smith, Sub. Com. Chair, has agreed to resolve the metrification issue with IEEE.
- The meeting adjourn at 02:45 PM

C57.12.28, C57.12.29, C57.12.31 & C57.12.32 Standards previously under the NEMA Secretariat are reviewed and revised NOW under the IEEE Transformer Committee Secretariat)

10.2.2.4 C57.12.28 Pad-Mounted Equipment Enclosure Integrity
(Copyright: IEEE/**NEMA – Joint Copyright MOU**)
Bob Olen & Dan Mulkey Co Chairs
(bolen@cooperpower.com & dhm3@pge.com)

PAR Status: Submitted (Covered under continuous development) Anticipate approval by NES Com May 09, 2002
PAR expiration Date: Anticipate Completion by December 2004
Current Standard Date: ANSI/NEMA 1999
Current Draft Being Worked on: #1.0 Dated: N/A
Meeting Time: April 16, 2002 Time: 8:00 AM
Attendance: 42 Total
25 Members
17 Guests

Issues, Remarks & Announcements:

- Line item review conducted of current ANSI C57.12.28 Standard
- Routine Design and Conformance Test definitions to be reviewed
- Penta Head Bolt will be redesigned to include washer
- Design of the Pry Bar Tool will be reviewed. Either a new design or a written description of the tool will be created.
- The probe wire will be reviewed
- The salt spray paint test will be eliminated from the standard
- All of the remaining paint tests were reviewed with no changes suggested at this meeting
- The Prohesion Corrosion Test for paint was presented. A recommendation was made to compare the Prohesion Test to the SCAB Corrosion Test currently included in the standard. Round Robin testing will be conducted. Four companies volunteered to conduct testing – other companies were

encouraged to contact the working group chairman and participate in the testing.

- The ANSI Format will be converted to the IEEE Format and presented at the October 2002 meeting
- Two concurrent sessions were scheduled to discuss the 4 Enclosure Integrity Standards. The review of C57.12.28 ended at 10:35 AM, which only allowed for a 10 minute discussion of the C57.12.29 Standard

10.2.2.5 C57.12.29 Pad-Mounted Equipment Enclosure Integrity for Coastal Applications

Bob Olen & Dan Mulkey Co Chairs
(bolen@cooperpower.com & dhm3@pge.com)

PAR Status: Submitted (Covered under continuous development) Anticipate approval by NES Com May 09, 2002
PAR expiration Date: Anticipate Completion by December 2004
Current Standard Date: ANSI/NEMA 1999
Current Draft Being Worked on: #1.0 Dated: N/A
Meeting Time: April 16, 2002 Time: 8:00 AM
Attendance: 42 Total
25 Members
17 Guests

Issues, Remarks & Announcements:

- Recommendation to keep C57.12.29 and C57.12.28 as separate documents. IEEE Editorial Staff and NESCOM Representative. Working Group supportive of the separation.
- Due to the time restraints only the major requirements of the standard were presented.
- Substrate performance requirements dictating the use of a minimum of 409 stainless steel
- Enclosure security section will be copied from C57.12.28 into this standard
- Coating System requirements reviewed
- Corrosion resistance of the coating system is dictated by an Outdoor Coastal Test Site Exposure Test
- Remaining 6 coating tests viewed by working group
- The meeting was adjourned at approximately 10:50 AM.

10.2.2.6 C57.12.31 Pole Mounted Equipment Enclosure Integrity

Bob Olen & Dan Mulkey Co Chairs
(bolen@cooperpower.com & dhm3@pge.com)

PAR Status: Approved by NESCOM December 2001
PAR expiration Date: December 2005
Current Standard Date: ANSI/NEMA 1996
Current Draft Being Worked on: 1.4 Dated: March 26, 2002
Meeting Times: April 16, 2002 Time: 8:00 AM
Attendance: 42 Total
25 Members
17 Guests

Issues, Remarks & Announcements:

PAR APPROVED Draft currently being balloted by IEEE to IEEE – SA members. 62 Members signed up to ballot the standard. The due date for ballots is May 22, 2002.

10.2.2.7 C57.12.32 Submersible Equipment Enclosure Integrity

(Copyright: IEEE/**NEMA – Joint Copyright MOU**)
Bob Olen & Dan Mulkey Co Chairs
(bolen@cooperpower.com & dhm3@pge.com)

PAR Status: Approved by NESCOM December 2001
PAR expiration Date: December 2005
Current Standard Date: ANSI/NEMA 1994
Current Draft Being Worked on: 1.3 Dated: March 26, 2002
Meeting Times: April 16, 2002 Time: 8:00 AM
Attendance: 42 Total
25 Members
17 Guests

Issues, Remarks & Announcements:

- The meeting was called to order at 8:00 AM on Tuesday, April 16, 2002.
- Opening remarks related to the responsibilities of the IEEE Enclosure Integrity Working Group
- Introductions of all members and guests present
- Minutes of October 16, 2001 meeting in Orlando were approved by the Working Group
- Status of C57.12.32 Standard presented – PAR APPROVED
- Draft currently being balloted by IEEE to IEEE – SA Members. 56 Members signed up to ballot the standard. The due date for the ballots is May 24, 2002

10.2.2.8 C57.12.33 Guide For Distribution Transformer Loss Evaluation

(Copyright: **IEEE**)
Don Duckett & Tom Pekarek Co Chairs
(don.duckett@fpc.com & tjpekarek@firstenergycorp.com)

PAR Status: Due to expire this year – PAR extension request will be filed this month
PAR expiration Date: December 2002
Current Standard Date: October 2001
Current Draft Being Worked On: #9 Dated N/A
Meeting Date: 04-16-02 Time: 11:00
Attendance: 41 Total
21 Members
17 Guests

Issues, Remarks & Announcements:

- The unresolved negative votes on Draft 7 are related to Clause 6, the transformer efficiency tables from NEMA TP 1. Discussions at the Tuesday, April 16 meeting produced a revision for the draft document that we believe will resolve the negative votes. The revision removes all of Clause 6 except the following sentence: "When a user chooses not to use the procedures as defined in Clauses 1 through 5 of this standard, Department of Energy and/or NEMA documents can be used to define minimum acceptable efficiency limits". The proposal will be incorporated into Draft 9 and submitted for a re-circulation ballot in a few months.

10.2.2.9 C57.12.34 Three-Phase Padmounted Distribution Transformers

Ron Stahara & Steve Shull Co Chairs
(rjstahara@msn.com & sshull@empiredistrict.com)

PAR Status: Approved 9/21/1995 (For Standard Development)
PAR expiration Date: December 2002
Current Standard Date: NEW Standard Under Development

This NEW Standard is a combination of the following two Standards
C57.12.22 1989 (Three-Phase Padmounted Distribution Transformers with H.V. Bushings) (Copyright ANSI)
C57.12.26 1992 (Three-Phase Padmounted Distribution Transformers with Separable Connectors) (Copyright ANSI)

Current Draft Being Worked On: 8 Dated: January 2002
Meeting Date: 04-15-02 Time: 03:15 – 04:30
Attendance: 40 Total
23 Members
17 Guests

Issues, Remarks & Announcements:

- Ed Smith opened the meeting by asking Noelle Humenick to give us a clear direction on the metrification of this standard. Noelle indicated that the document must be in metric units with the exception of hardware items such as bolts and fasteners. She did point out that the imperial units could be placed in footnotes and informative annexes. She clarified that these are not considered to be a part of the standard but are there only for clarification. A few interesting comments came from this discussion. These are listed as follows:
  - Kent Miller, T&R Electric stated that he would disapprove any standard that has just metric units.
  - Don Duckett, FPL, pointed out that his company would not be using any metric units in any of their internal standards. They made this decision based on safety issues with the lineman's installation of hardware.
  - Brian Klaponski, Carte International, commented that even though Canada converted their measurement system to metric, there continues to be items that remain in the imperial measurement system.
- After this discussion, it was the consensus of the group that the metric only version of a standard was a problem for users and producers, and that a dual measurement system was more consistent to the needs of the industry that use distribution transformers. With this in mind, Ed Smith suggested that a call be made to IEEE to discuss this issue.
- Steve Shull reported that the standard was out for ballot and to date had 23 returns. The total pool was somewhere around 100 individuals. In this group of returned ballots, there were two disapprovals.
- Ron Stahara stated that one of the negatives concerned the specified secondary voltages. The commenter wanted the standard more internationalized by changing this secondary voltage to 1000V or less. After some discussion, Ken Hanus summarized that the intent of the standard was for specific voltage designs and configurations more specifically targeted to the Americas rather than Europe. He pointed out that Europe doesn't use

these designs or configurations. The consensus of the group was to leave this as it is now written.

- Ron Stahara stated that the other negative had to do with the impedance ranges of the various unit sizes. Ron said that this had been discussed in the past and the footnote was added to this table to provide a warning that some of the impedances will result in high currents. He felt that for the present draft it should stay the same. The group agreed.

- Ron said that he had been approached by Mike Culhane concerning Figure 2 configuration. He asked him to review his concern. He explained that the parking stands are shown extended and had an additional parking stand. He felt that this should have flush parking stands and the additional parking stand that is shown on the lower right side of the bushing "V" should be eliminated. The group agreed that this should be changed.

10.2.2.10 C57.12.35 Bar Coding For Distribution Transformers

(Copyright: **IEEE**)
George Henry Chair
(gehenry@centralmoloneyinc.com)

PAR Status: Active for Reaffirmation
PAR expiration Date: The PAR expires December 2002
Current Standard Date: 1996
Current Draft Being Worked On: NONE
Meeting Time: ***DID NOT MEET THIS SESSION***

Issues, Remarks & Announcements:

- Document balloted for reaffirmation. Ballot closed on 03-04-02. See attached sheet for ballot summary of IEEE Transformers Committee, which closed with 81% returned ballots, 95% affirmative votes. No attempt made, as yet, to resolve negative ballots. Ballot summary of ASC57. This ballot was not successful, with only 10 of 26 eligible voters returning ballots (38%). This ballot deadline is being extended for 60 days (May 3, 2002).

- Ballot Summary

  C57-35-1996 Reaffirmation: IEEE Standard for Bar Coding for Distribution Transformers closed March 04, 2002.

  77 Number of eligible people in Ballot Group
  60 Affirmative votes
  03 Negative votes
  0 Abstention votes
  63 Votes = 81% Returned
  0% Abstention

  60 Affirmative votes
  3 Negative votes
  63 Votes = 95% Affirmative

10.2.2.11 C57.12.36 Distribution Substation Transformers

John Rossetti & Leon Plaster Co Chairs
(jrossetti@mlgw.org & leon.plaster@us.abb.com)

PAR Status: The PAR will be revised to include the definition of Distribution Transformers and then resubmitted along with C57.12.10. (see below)
PAR expiration Date: Not Yet Approved
Current Standard Date: NEW Standard Under Development
Current Draft Being Worked On: #1 Dated April 4, 2002
Meeting Date: 04-16-02 Time: 1:45PM
Attendance: 22 Total
11 Members
10 Guests
1 Requested Membership

Issues, Remarks & Announcements:

- The PAR will be revised and resubmitted along with C57.12.10, prior to the June NESCOM meeting. Another old standard, C57.12.13 (Conformance req'ts for unit subs), will be added to the document review list. Due to many large industrial applications, we'll need to keep in mind potential NEC and NESC issues. Regarding the draft document, there was discussion in three areas; KVA ratings, voltage ratings, and BIL Tables. The lower limit for single phase KVA will be removed from the scope. Acceptable voltage ratios will be added. A single BIL valve will be provided for each voltage class.

- Minutes from WG to develop C57.12.36, Liquid-Immersed Distribution Substation Transformers; April 16, 2002 – Vancouver, BC

- The working group for Distribution Substation Transformers met on Tuesday, April 16, 2002, at 01:45 PM. There were 21 people in attendance, 11 members, 10 guests and 1 request for membership. This brings the total membership count to 36.

- Minutes from the Orlando meeting were distributed and no changes were suggested.

- The status of the PAR was reviewed. A conference call was held on April 3rd [Jim Sim, Tom Prevost, John Rossetti, Dave Aho, and Daleep Mohla – from NESCOM] and the purpose of this call was to try and clarify everyone's position on the revision of C57.12.10 and the development of C57.12.36. The result was an agreement to remove the lower end ratings from the scope of C57.12.10 and simply refer to the definitions in C57.12.80 for distribution and power transformers.

- The PAR for both C57.12.10 and C57.12.36 will be revised and forwarded to NESCOM for review prior to their meeting in June.

Document Review:

- John Rossetti suggested that C57.12.13 (conformance requirements for liquid-filled transformers used in unit installations, including unit substations) should be evaluated to determine if any information should be incorporated into C57.12.36. Additional documents on the review list are NEMA TR 11, NEMA 201, NEMA 210 and C57.12.10.

- One concern raised was that since many of the applications for the transformers encompassed by this standard will be directed toward large industrials, will we need to deal with any NEC or NESC issues? There is no specific action necessary at this time.

Issues from the draft document dated 04-04-02:

- Scope and KVA Ratings – decided not to have a lower end KVA limit in the scope for single phase ratings. Standard KVA ratings will be stated in a table. Although this creates a rating overlap with the single phase overhead product standard (C57.12.20), the user will need to select the standard most applicable to their application.
- Voltage Ratings – Instead of having tables, we'll refer to C57.12.00 and C84. There will be some thought put into acceptable voltage ratios based on KVA ratings.
- BIL Tables – After much debate, we decided to keep a table and recommend only one BIL level for Each voltage class. Although not everyone was in agreement, the direction was to state the most common BIL levels, specifically for 25 and 34.5 KV class, that provided a higher margin of protection. (25 KV – 150 BIL, 34.5 KV – 200 BIL). A statement will be added to refer the user to C57.12.00 for other available ratings.

We ran out of time just as the exciting debate over impedance valves was starting. Everyone was asked to submit comments as quickly as possible on the remainder of the document

The meeting adjourned at 03:00PM. .

10.2.2.12 C57.15 Step-Voltage Regulators

Craig Colopy & Gael Kennedy Co Chairs
(ccolopy@cooperpower.com & grkenne@nppd.com)

PAR Status: Approved
PAR Expiration Date: December 2004
Current Standard Date: C57.15 – 1999 – Published April 2000
Current Draft Being Worked On: Draft 1.0 Dated: April 2002
Meeting Date: Tuesday, April 16 Time: 3:15PM
Attendance: 26 Total
8 Members
16 Guests
6 Requested Membership

Issues, Remarks & Announcements:

- Gael Kennedy, Nebraska Public Power District, has agreed to be a Co-Chair with the working group.
- Latest standard, C57.12.00 and C57.12.90, will be used to keep C57.15 as a stand alone document.
- Clarification with regard to the amount of voltage regulation available at the extreme tap positions of a Type A and Type B configuration will be addressed.
- Latest agreed upon format for dimensions will be used.
- Elimination of 55˚ C winding temperature rise rating is being considered with the 65˚ C winding temperature rise rating established as the standard.

- Increasing the maximum limit of supplementary continuous – current from 668 to 875 amps is being considered.
- Tables of preferred ratings are being revised with the addition of larger KVA sizes, 46 KV-single phase rating and two additional tables covering 50 Hz, single and three phase regulators, three phase, 69 KV designs, are being proposed to be eliminated from the tables.
- Clarifying the availability of 40 times rated short circuit withstand designs is being addressed. Elimination of the 40 X rated option for 500 KVA below is being considered.
- Adding a bushing terminal to Table 12 for ratings; 669 – 2000 amps is being considered with 4-hole spades being preferred.
- Clarifying the type of pole mounting brackets required for the smaller KVA designs will be addressed. Reference to C57.12.20 Standard is not applicable since the type of pole mounting brackets on regulators is dependent on total weight, not KVA size.

10.2.2.13 P1388 Electronic Reporting of Test Data

Richard Hollingsworth & Jerry Smith Co Chairs
(rhollin@howard-ind.com & jwsmith@southernco.com)

PAR Status: Approved
PAR Expiration Date: December 2005
Current Standard Date: Published under IEEE Std. 1388-2000
Current Draft Being Worked On: Draft 2 Dated: April 16, 2002
Meeting Date: April 16, 2002 Time: 9:30AM
Attendance: 16 Total
9 Members
7 Guests
2 Requested Membership

Issues, Remarks & Announcements:

- At the fall meeting in Orlando – 2001, the suggestion was made to add voltage regulators to the scope of the document. This is being tabled until the next PAR is requested because a change in the scope will require a new PAR.
- At the fall meeting in Orlando – 2001, the suggestion was made to identify and specify general types and classes of insulation fluid in paragraph 4.3.9. The working group decided to leave the paragraph general and let any definition be agreed upon by the user and producer.
- Paragraph 5.3.2 – correct the reference by "standard set of test data described in 5.2.2".
- It was suggested that new fields be added to the data set so users could calculate loss of life in actual equipment location. The working group decided to change Paragraphs 5.3.2 and 5.3.3 which would accommodate this need. The new wording is as follows:

  Paragraph 5.3.2 –"When the user specifies a standard data set and a comma delimited file, they will receive the standard set of test data described in 5.2.2, except the data set length can vary from the specified table but must conform to those data types outlined in the table."

- Paragraph 5.3.3 (Last sentence) " Only the single line record is offered, similar to the consolidated record described in 5.2.4, except the data set length can vary from the specified tables but must conform to these data types outlined in the

10.2.3 Subcommittee Old Business:

NONE

10.2.4 Subcommittee New Business:

- NEMA/IEEE MOU Termination
- Metrification, Metrification/Imperial “Dual Format”