IEEE/PES TRANSFORMERS COMMITTEE MEETING

SEPTEMBER 28, 1994

MILWAUKEE, WISCONSIN

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ATTENDANCE SUMMARY

MEMBERS PRESENT

E. J. Adolphson
D. J. Allan
R. Allustiarti
M. S. Altman
G. Andersen
D. E. Ayers
R. L. Barker
D. A. Barnard
E. A. Bertolini
W. B. Binder, Jr.
W. E. Boettger
J. V. Bonucchi
J. D. Borst
C. V. Brown
D. S. Brucker
M. Cambre
D. J. Cash
D. Chu
J. L. Corkran
D. W. Crofts
T. Diamantis
L. E. Dix
R. F. Dudley
F. E. Elliott
D. J. Fallon
P. T. Feghali
J. A. Fleeman
S. L. Foster
M. A. Franchek
J. M. Frank
D. L. Galloway
A. A. Ghafourian
R. D. Graham
R. L. Grubb
F. J. Gryszkiewicz
M. E. Haas
N. W. Hansen
K. S. Hanus
J. H. Harlow
W. R. Henning
K. R. Highton
P. J. Hopkinson
E. Howells
P. Iijima
C. W. Johnson, Jr.
A. J. Jonnatti
R. D. Jordan
C. P. Kappeler
J. J. Kelly
S. P. Kennedy
W. N. Kennedy
A. D. Kline
J. G. Lackey
M. Y. Lau
J. P. Lazar
F. A. Lewis
H. F. Light
S. Lindgren
W. A. Maguire
J. W. Matthews
J. W. McGill
C. P. McShane
R. McTaggart
S. P. Mehta
M. C. Mingoia
M. I. Mitelman
H. R. Moore
W. E. Morehart
D. H. Mulkey
C. R. Murray
R. J. Musil
W. H. Mutschler, Jr.
C. G. Niemann
E. T. Norton
P. E. Orehek
G. A. Paiva
B. K. Patel
W. F. Patterson
J. M. Patton
P. A. Payne
L. C. Pearson
T. J. Pekarek
D. Perco
M. D. Perkins
V. Q. Pham
L. W. Pierce
R. L. Plaster
D. W. Platts
J. Puri
P. Riffon
P. G. Risse
S.M.A. Rizvi
C. A. Robbins
R. B. Robertson
J. R. Rossetti
G. W. Rowe
W. E. Saxon
R. W. Scheu
D. N. Sharma
V. Shenoy
H. J. Sim
J. E. Smith
J. E. Smith
S. D. Smith
R. J. Stahara
W. W. Stein
L. R. Stensland
J. C. Sullivan
R. C. Thomas
J. A. Thompson
T. P. Traub
E. R. Trummer
G. H. Vaillancourt
R. A. Veitch
L. B. Wagenaar
R. J. Whearty
A. L. Wilks

MEMBERS ABSENT

B. F. Allen
S. Bennon
J. C. Crouse
D. H. Douglas
K. Edwards
R. S. Girgis
C. C. Honey
D. C. Johnson
E. Koenig
R. I. Lowe
K.T. Massouda
C. K. Miller
H. A. Pearce
M. P. Sampat
D. W. Sundin
L. A. Tauber
B. H. Ward

J. C. Arnold
J. H. Bishop
V. Dahinden
J. C. Dutton
H. G. Fischer
P.J. HOEFLER
J. W. Howard
E. Kallaur
L. W. Long
D. S. Lyon
A. D. McCain
R. E. Minkwitz, Sr.
J. D. RAMBOZ
L. J. Savio
D. S. TAKACH
J. B. Templeton
D. W. Whitley

J. Aubin
T. Clark
J. N. Davis
J. K. Easley
D. W. GERLACH
G. H. Hall
J. Hunt
R. B. Kaufman
L. A. Lowdermilk
C. MILLIAN
C. J. McMillen
S. H. Osborn
V. Raff
L. R. Smith
A. M. TEPLITZKY
V. Thenappan
W. E. Wrenn

R. A. Bancroft
O. R. Compton
R. C. Degeneff
J. A. Ebert
D. A. Gillies
F. W. Heinrichs
G. W. Iliff
J. P. Kinney, Jr.
D. L. Lowe
J. Ma
W. J. McNutt
K. Papp
C. T. Raymond
R.W. Stoner
R. W. THOMPSON
C. W. WILLIAMS, JR.

GUESTS PRESENT

T. M. Adams
R. Anderson
R. Baehr
A. Bolliger
A. C. Chan
K. P. Ellis
R. Garcia
R. L. Grunert
R. R. Hayes
K. S. Knoerr
R. P. Marek
S. P. Moore
G. Preininger
G. J. Reitter
D. M. Shah
J. W. Smith
C. E. Valencia
W. G. Wimmer

A. Alcantara, Jr.
J. Antweiler
D. E. Ballard
J. L. Brown
J. M. Christini
J. Foldi
J. A. Gauthier
E. Hanique
G. E. Henry III
P. E. Krause
N. P. McQuin
L. Napoli
R. L. Provost
A. L. Robinson
T. Siebert
T. H. Stewart
F. N. Weffer
D. J. Woodcock

D. Anderegg
J. Arteaga
B. L. Beaster
W. J. Carter
F. Costa
B. I. Forsyth
D. F. Goodwin
J. W. Harley
T. L. Holdway
B. Kumar
S. E. Michael
R. C. Nordman
R. I. Psyck
D. J. Rolling
P. Singh
A. Traut
K. Weidmann

G. W. Anderson
M. P. Austin
T. E. Blackburn III
A. P. Centore
D. Dohnal
J. Frost
J. Goudie
R. H. Hartgrove
E. W. Hutter
T. Lewis
A. Molden
B. Poulin
D. R. Purohit
V.S.N. Sankar
K. R. Skinger
S. C. Tuli
F. E. Willett

Contents

IEEE PES TRANSFORMERS COMMITTEE MEETING
WEDNESDAY, SEPTEMBER 28, 1994

Chair: J. H. Harlow Vice Chair: W. B. Binder, Jr.

Secretary: J. W. Matthews

1.0 Chair's Remarks and announcements - J. H. Harlow

J. H. Harlow called the meeting to order at 8:03 am.

S. P. Mehta, Meeting Host, reported on the attendance (see Attachment 4) and acknowledged the help of the Co-host Jack McGill and his wife, and Elizabeth Brucks. The Committee thanked the Hosts with a round of applause.

Mr. Harlow announced the untimely death of Henry Windisch, who was to be the Host for the next meeting, and introduced Greg Anderson as his replacement.

Greg extended an invitation to the next meeting to be held in Kansas City during April 23-26, 1995. Arrangements have been made at the Hyatt Regency Crown Center and room rates will be $90 single and double plus tax.

Greg commented on Henry Windisch's contributions to our industry, particularly his willingness to share his knowledge. Bill Mutschler then presented a tribute to Henry which is included in these minutes as Attachment 5.

The Chair proceeded with the reports on the Technical Council and Administrative Subcommittee meetings.

1.1 Report of the Technical Council Meeting, July 26, 1994.

The PES Technical Council met at the 1994 Summer Power Meeting July 26, 1994, in San Francisco. Following are points of note.

1.1.1 1994 Technical Council Goals

The Chair, Don Volzka, reiterated his goals for the Technical Council for 1994. A statement of those goals is attached. The goal of most import to the Transformers Committee relates to cooperation with "Sister Organizations," such as CIGRE. The Transformers Committee has already taken four steps to promote such cooperation with CIGRE, notably:

- An invitation to Dr. Reinhart Baehr, incoming chair of SC12 to attend this (Milwaukee) meeting. He responded that he will attend. (Dr. Baehr was in attendance and was introduced at the main committee meeting.)
- A regular semi-annual report of CIGRE activities to the Transformers Committee by Bill Kennedy, US Representative to SC12.

- The distribution to the Transformers Committee membership, by Bill Kennedy, of the technical paper which was the basis of discussion at the SC12 meeting September 2, 1994. The membership was thereby afforded the opportunity to respond to the advance questions.

- A member of the Transformers Committee and present chair of SC12, Professor Dennis Allen, is the scheduled speaker at the committee luncheon September 27, 1994. (Dennis Allen was also in attendance at the main committee meeting and was introduced by Mr. Harlow. Highlights of his presentation at the luncheon are included as Attachment 6.)

1.1.2 Technical Paper Presentation Form

The matter of the form of presentation of technical papers at the Winter and Summer Power meetings was discussed. There is some sentiment that formats other than the traditional 20 to 30 minute presentation/discussion should be explored, including:

1. 'Presentation in essence only" A very brief (5 minute) presentation oriented for subsequent discussion by persons who have previously studied the paper.

2. 'Poster Session" Authors would be available for 3 hours to discuss the paper at length with interested persons.

3. Presented 'In tutorial" where the goal is to *educate*. Presentation may last 45 to 90 minutes.

There will be more discussion on this at the 1995 WPM.

1.1.3 Standards Numbering System

There has not been a resolution of the NEMA trademark claim to ownership of the "C57" designation. A judgment from the Trademark office may require up to 18 months. In the meantime, the IEEE Standards Board will issue IEEE project numbers for PARs.

Other topics discussed at the Technical Council will be covered in the Vice Chair's and Standards Coordinating Committee Reports.

1.2 Memorandum of Understanding between IEEE and NEMA as co-secretariat of C37 and C57.

The MOU was prepared March 10, 1994 and discussed at the C57 meeting March 23, 1994 in Dallas. The MOU affirms the intent for cooperation between IEEE and NEMA as co-secretariat, noting that the organizations have equal responsibilities.

Included in the provisions of the MOU is the statement that each organization will submit its own standards to ANSI, with notification to the other organization. Each organization will publish its standards following ANSI recognition.

The MOU does not detail the logistics of the process. This will be a topic for discussion at the September 28, 1994 meeting of C57 in Milwaukee.

Respectfully submitted, J. H. Harlow, Chair

1994 TECHNICAL COUNCIL GOALS

The Technical Council Goals for 1994 were presented to the Executive Committee at the Chicago meeting. I will summarize the status of each briefly.

- Completion of the plans for Implementation of the "STANDARDS - VISION FOR THE FUTURE" is in the very capable hands of the Chair of the Standards Coordinating Committee, Fred Kimsey, and the PES International Program Engineer, Anne O'Neill. Fred will include this in his report.

- Reorganization of Technical Council remains a priority. My intent is to focus on two specific areas outlined by Jerry Hagge in his report on the subject. This will be covered under a specific discussion item.

- Cooperation with our sister societies and organizations has been recognized as a very important action and state of mind. I will be forming a very small task force reporting to me whose basic assignment will be to point the way to make this happen and happen in a very positive fashion. Some are international and require specific knowledge of their procedures and expectations.

- My goals regarding meetings has two aspects. The first is to overhaul the process by which panel sessions get planned and approved. Bruce Wollenberg, Vice Chair of Power System Engineering, has volunteered to coordinate the effort to define the process of how it should be done and document it. The goal is to bring this to Technical Council for approval at the Winter Meeting. At present we are very inconsistent and I am sure we can improve the quality of our sessions through this effort.

  The second part of the 1994 meetings planning and scheduling goals has to do with technical committee meetings held at General Meetings. Vice Chair Lambert will review our procedures, work with Special Services to improve the process, and document them. Since this is primarily an update of present procedures, the intent is to have this in place this Fall.

2.0 Approval of Minutes of March 23, 1994 - J. H. Harlow

The minutes of the Dallas meeting were approved with the correction that the following members were in attendance: R. L. Barker, J. D. Borst, D. W. Crofts, D. J. Fallon, D. L. Galloway, and A. A. Ghafourian.

3.0 Vice Chair's Report - W. B. Binder, Jr.

Prior to presenting the Vice Chair's report, Mr. Binder made the announcement that the US Technical Advisory Group to IEC-98 Electrical Insulating Systems is extending an invitation to anyone interested in working on this TAG. Interested parties were advised to contact Paulette Payne at (202) 331-6617 or R. W. Simpson, to obtain the address for the TAG Chair, Mr. Dick Weddleton.

3.1 PES Committees on which the Vice Chair serves as Committee representative.

The following are reports on activities of PES Committees on which the Vice Chair serves as Committee representative. All of the meetings reported were held at the 1994 Summer Power Meeting in San Francisco, CA on July 25-26, 1994.

3.1.1 Publications Committee (Meeting held Monday, July 25, 1994, 2:00 pm)

3.1.1.1 Modified PES Publication Guide

Copies are issued as part of the Author's Kit and can be issued to reviewers if they desire.

3.1.1.2 Paper Review Form

A newly revised form will be used for grading WPM papers. The form was not used by Transformers Committee reviewers for the SPM or extensively by other Technical Committees either.

The new form allows for only three grades: Accept, Accept with Mandatory Changes, or Reject. A Reject grade allows for one re-submission at a later conference. There is no longer a RJO grade to reject outright. All Transformer Committee papers reviewed for the SPM were converted to this grading method.

3.1.1.3 1994/95 Paper Budget

A six page limit per paper will be administered by Nancy Heitmann's office at IEEE Headquarters. Working Group papers are being published, therefore they are going against the 5000 page budget. The committee felt that this should count against each committee's allocation.

3.1.1.4 Paper Usefulness:

Discussed proposals to:

a) Conduct Poster sessions instead of/in addition to Paper Sessions

b) Create more IEEE/PES Special Publications (to publish working group reports, etc.)
c) Implement more Conference grade papers.

Each Technical Committee needs to decide for its own purposes. This will continue to be an item of discussion.

3.1.1.5 1994 Summer Power Meeting Panel Sessions:

Future deadlines are 3/1 and 9/1 for name of Panel Chairs, Panelists, and Title. Transformer Committee will have no panels at the 1995 WPM or the 1995 SPM.

3.1.1.6 Off Site Papers

PSRC sought and received permission to present more papers at their Committee meetings. Problems can exist in meeting deadlines for submission of discussions. This only delays publication, not acceptance of the paper.

3.1.1.7 Scheduling of Panel Sessions

The Power System Engineering Committee presented a "Pink Sheet" modified to handle Panel sessions. It is intended to alleviate problems in schedule conflicts in the PSEC which meets at the SPM and WPM at the same time Panel Sessions are held.

3.1.2 Organization and Procedures Committee (Meeting held Tuesday, July 26, 1994, 8:00 am)

3.1.2.1 Technical Committee Reports

I reported the changes in Subcommittee Chairmen since the WPM and on the additional work being undertaken in the Standards Subcommittee Working Groups.

3.1.2.2 Streamlining PES Activities

No specific action was taken on this matter though Chair Edmonds believes that the TCO & PC will play a large role.

3.1.2.3 Standards Interpretations

Several Technical committees presented formal procedures for standards interpretation. The O&P Committee is considering adopting a minimum practice which adheres to the IEEE Standards Board requirements. A need exists to establish a consensus practice to limit risk. No single response is allowed by Standards Board.

3.1.2.4 Under New Business

Don Volska recommended to each Technical Committee that the Directory update this fall be used as an opportunity to clean up the Committee structures, to streamline, and to rotate off the "deadwood" of the Committees. Harry Jones of the Energy Development and Power Generation Committee proposed that a task force be established to determine the feasibility of having all Technical Committees meet together. Chair Edmonds made this an action item for each Vice

Chair to report on at the next TCO & PC meeting. it was also suggested that modern technology be used to eliminate the need for travel to remote locations (i.e., Teleconference, Video conference, etc.).

3.1.3 Technical Sessions Improvement Committee (Meeting held Tuesday, February 1, 1994, 2:00 pm) - Jim Harlow substituted for Chair Boyle

3.1.3.1 Sessions Evaluation

Two lists of comments were discussed relative to improvement of meeting rooms and improvement of presentations. An assignment was made to generate a checklist for meeting rooms for the organizing committee. Problems with presentations need to be addressed in the Guide for Session Chairmen. Paper Coordinators ought to send Session Chairmen a package including a letter of greeting to be sent to authors, a copy of each of the papers, and some suggestions on how to run the session (including the "Guide for Session Chairs"). Don Volska suggested that two forms of presentation be considered: tutorial mode (spend a long time discussing) or presentation by title only (as in the poster session concept).

We also discussed ways to encourage discussion. Coordinators are encouraged to distribute copies of accepted papers for discussion. Reviewers should be encouraged to provide discussions.

3.1.3.2 Improving Foreign Papers

No additional action has taken place.

3.1.3.3 Improved Discussions

In addition to the above discussion, we reviewed techniques for stimulating discussions. Paper Coordinators or Session Chairs should stimulate discussion.

3.1.3.4 Anonymous Review

We discussed the anonymous review. The consensus reached was to do away with the program, but no decision will be made until the WPM.

3.1.3.5 Guidelines for Slides and Overheads presentation at Author's breakfast

A professional consultant can make a video tape to send to authors. Feedback on the value of the live presentation now used vs. a video cassette would be appreciated.

3.1.4 IEEE/PES Summer Power Meeting Technical Paper Sessions

The Transformers Committee sponsored two paper sessions at the SPM which were well attended. Ten papers were accepted and presented out of twenty that were reviewed. Lin Pierce and Jim Harlow acted as Session Chairmen. Their contributions are greatly appreciated.

3.2 1994 T & D Conference, April 10-15, 1994

3.2.1 Panel Sessions

The Transformers Committee sponsored three panel sessions in Chicago:

Ferroresonance - M. P. Sampat
Underground Transformers and Network Protectors - P. E. Orehek
Transformer Tapchanging Under Load - T. P. Traub.

3.2.2 Technical Sessions

The Transformers Committee sponsored one session in Chicago. There were two conference papers and one transaction paper presented. One accepted paper was withdrawn. Ken Hanus chaired the Technical Session. Thanks to Ken for that assistance.

3.3 Future Meeting Schedule

April 23-26, 1995	Kansas City, MO	Henry Windisch
November 5-9, 1995	Boston, MA	Ken Skinger
Spring, 1996	San Francisco	Dan delaCruz

This schedule only extends for three more meetings. Commitments from hosts are needed for meetings Fall, 1996 and beyond. The planning should be starting very soon. Should we consider holding joint meetings with other committees? Should we consider holding some or all future meetings in conjunction with the Summer or Winter Power Meetings?

Respectfully submitted,

W. B. Binder, Vice Chair

4.0 Administrative Subcommittee - J. H. Harlow

ADMINISTRATIVE SUBCOMMITTEE MEETING MINUTES
SEPTEMBER 26, 1994
MILWAUKEE, WISCONSIN

4.1 Introduction of Members and Guests

Chair Harlow called the meeting to order at 6:47 p.m. in the Roosevelt/Kennedy Room of the Pfister Hotel.

The following members of the Subcommittee were present:

W. B. Binder, Jr.	W. F. Patterson	B. Poulin (rep. J. B. Templeton)
J. D. Borst	W. N. Kennedy	J. Puri
D. S. Brucker	J. W. Matthews	J. E. Smith
F. J. Gryszkiewicz	P. E. Orehek	G. H. Vaillancourt
K. S. Hanus	B. K. Patel	L. B. Wagenaar
J. H. Harlow	L. W. Pierce	

The following guests were present:

G. W. Anderson - Kansas City Meeting Host
S. P. Mehta - Milwaukee Meeting Host
Gary McCulla - Vice Chair, West Coast Subcommittee
Luigi Napoli - Staff Engineer, IEEE Standards Office
Ken Skinger - Boston Meeting Host

4.2 Approval of the Dallas Meeting Minutes

There were no additions or corrections to the minutes of the previous Administrative Subcommittee meeting. They were approved as published.

4.3 Additions to and/or Approval of the Agenda

There were no changes to the published agenda.

4.4 Committee Finances and Meeting Arrangements

4.4.1 Finances

Mr. Sam Mehta reported that the expenses of the Milwaukee meeting were expected to exceed the income by approximately $1000. This was planned to reduce the slight surplus income from previous meetings.

4.4.2 Meeting Arrangements

The Milwaukee meeting host, Mr. Sam Mehta, reported the following registration as of Monday:

Members and guests	272
Spouses	46
Tuesday Luncheon	151
Spouses Tours - Monday	42
Tuesday	32
Tuesday Outing	188

Mr. Mehta made the following suggestions/comments for future meeting hosts:

- The financial arrangements could be made easier if a continuous bank account were established (i.e. through IEEE).

- One difficulty encountered in arrangements was late requests for audio/visual equipment. Even though the Subcommittees were surveyed well in advance, three requests for equipment were placed at the hotel.

Mr. Greg Anderson, host for the next Committee meeting in Kansas City, announced that the meetings will be held at the Hyatt Regency Hotel at Crown Center on April 23 - 26, 1995. The room rates will be $90 single or double plus tax.

The Fall 1995 meeting will be hosted by Mr. Ken Skinger in Boston during November 5 - 8, 1995, at the Marriott Longwharf Hotel. Room rates will be $140 single or double plus tax.

The Spring 1996 meeting will be hosted by Mr. Dan de la Cruz in San Francisco during April 13 - 17, 1996 at the Ana Hotel.

4.5 Standards Subcommittee - G. H. Vaillancourt

4.5.1 Standards and Coordination Activities

Mr. Vaillancourt presented his status report on transformer standards and coordination activities. The complete report is shown as part of the Committee minutes.

He began discussion of these activities with a review of the attachments to his report. The attachments were presented in a slightly different format than previously used. Attachment 4 will be separated and incorporated in the report from each subcommittee to which those standards are assigned. Attachments 1, 2, and 3 will be included as attachments to the Minutes.

Updates were made to the status of each document by the Subcommittee Chairs during this review.

It was noted that we should request responsibility for the C57.12.28, .29, .30, and .31 documents at the ANSI C57 meeting to be held this Wednesday. The status of responsibility for the C57.12.10, .13, .17, .53, and .54 documents must also be clarified.

4.5.2 Documents Submitted to the Standards Board

Three PAR's were submitted to NESCOM and two documents were submitted to REVCOM for approval. See the complete report for details.

Standards C57.21 and C57.114 are due for reaffirmation, revision, or withdrawal in December 1995.

Mr. Vaillancourt noted that we have about 20 projects that need approved PARs. Submittals should be made for these as soon as possible both to aid in coordination and also because a new PAR submittal form is being developed which will require more information than the present form.

The Standards Board meeting schedule is shown in the complete report.

4.5.3 PES Standards Coordinating Committee

This Committee met on July 25, 1994 in San Francisco.

The Committee discussed the NESCOM decision to revise the PAR form, which incorporates about 15 changes. Most of the changes are additions.

Ms. Anne O'Neill gave an update on PES Vision for the Future - Standards Action Plan. Internationalization of standards is still emphasized. A brochure on the IEC Organization is available to technical committee members. She is setting up a database of comparable IEEE and IEC standards.

The coordination of IEEE 62 was discussed again. PSIM will continue as official sponsor of the document. All technical committees will be given the opportunity to provide liaison members. The fact that each technical committee will have only one unified vote on the particular section of concern was not agreeable to all the technical committee representatives. This disagreement was not resolved.

4.6 Status of IEEE Standards - L. Napoli

Mr. Napoli did not present a formal report. He offered to address any questions which anyone had at that time.

Mr. Harlow asked for clarification on what changes can be made to a document during a ballot for reaffirmation. Mr. Napoli replied that no changes may be made. An errata sheet may be issued if an error is found, but no changes are allowed in the actual document.

Mr. Harlow noted that in the last meeting minutes a Chair had stated that he was going to reclassify a document to the new classification of Emerging Practices and Technology. Is this a classification for a standards document? Mr. Napoli replied that it was not. It is essentially a technical paper which is subjected to peer review and is made available to the public by the Standards Department.

Mr. Harlow asked for restatement of the IEEE Metric Policy. Mr. Vaillancourt read a letter which stated that IEEE has endorsed the use of the International System of Units. Mr. Napoli added that all symbols do not have to be immediately expressed in SI units, but it is preferred that SI units be used (with English equivalent units in parentheses) wherever possible.

4.7 Status of ANSI C57 Committee - L. Savio

Mr. Savio did not attend this meeting. Note that the C57 Committee will meet here on Wednesday afternoon.

Discussion of the status of various C57 documents led to the decision to request the transfer of responsibility for C57.12.28, .29, .30, and .31 to IEEE at the Wednesday meeting. These documents would then be maintained by the Distribution Transformers Subcommittee. We will also request clarification of the status of the C57.12.10, .13, .17, .53, and .54 documents at that meeting.

4.8 Awards Subcommittee - J. D. Borst

Mr. Borst's full report will be shown in the Committee minutes.

4.8.1 Committee Service Awards

Mr. Borst announced that four members will receive Certificates of Appreciation at the Wednesday meeting. They are:

Ken Hanus
David Lyon
Gerry Paiva
Jerry Thompson

Jim Howard has been identified to receive an award at the next meeting. The Subcommittee Chairs were requested to identify any others deserving an award at that time.

4.8.2 IEEE Standards Recognition

The IEEE Standards Board has issued a Working Group Chair Award to Bipin Patel. This award will also be presented at the Wednesday meeting.

4.9 Chair's Report - J. H. Harlow

Mr. Harlow presented his report which will be included in the Committee meeting minutes.

4.9.1 Review of Technical Council Activities

The following notes are from the PES Technical Council meeting held in San Francisco during the 1994 Summer Power Meeting.

4.9.1.1 Technical Council Goals

The 1994 Technical Council Goals (attached to full report) were briefly reiterated:

- Completion of plans to implement "STANDARDS - VISION FOR THE FUTURE".
- Reorganization of the Technical Council.
- Cooperation with our sister societies and organizations.
- Improvement of the panel sessions and technical committee meetings held at the General Meetings.

Very high emphasis was placed on transnationalization in the reiteration of these goals.

Mr. Harlow noted that four steps were taken by the Transformers Committee during 1994 to promote cooperation with CIGRE. These are listed in the full report.

4.9.1.2 Presentation of Technical Papers

The form of presentation of technical papers at the General Meetings was discussed. Three forms other than the traditional 20 to 30 minute presentation were suggested:

Presentation in Essence Only,
Poster Session, and
In Tutorial.

Descriptions of these presentation forms are in the full report. There will be more discussion on this subject at the next Technical Council meeting.

4.9.1.3 Standards Numbering

Mr. Harlow's report indicated that the IEEE Standards Board will issue IEEE project numbers until the trademark issue is resolved with NEMA. Mr. Napoli provided clarification that the IEEE Standards Board will issue IEEE Project numbers for new projects during this period. The Standards Board can issue IEEE Project numbers with C57 numbers in parentheses (if requested) for standard revision projects during this period.

4.9.2 IEEE and NEMA Co-Secretariat of C37 and C57

Details on the logistics of the process described in the March 10, 1994 Memorandum of Understanding were expected to be discussed at the C57 meeting to be held here on Wednesday. Mr. Napoli offered the attached procedures and flowchart which provide these details.

4.10 Subcommittee Activities - Subcommittee Chairs

4.10.1 Performance Characteristics - B. K. Patel

Better communications are needed during the balloting process by the IEEE office. The results of a recent ballot were not available in time for the Working Group to prepare for this meeting. Had the Chair known that the ballot was going to take so long (approximately two months), he would have handled that particular ballot personally. Mr. Napoli noted that occasionally as many as thirty ballots are received at one time which does slow down the balloting process.

It is becoming more and more difficult to obtain Working Group and Task Force members. It would be helpful if the IEEE administration could communicate more with Industry management to gain support in standards development. Mr. Harlow stated that he will contact Mr. Volska on this matter.

4.10.2 Distribution Transformers - K. S. Hanus

Mr. Hanus requested, and received, approval of Angie McCain as Co-Chair of the Electronic Data Transmittal WG and Tom Diamantis and Craig Colopy as Co-Chairs of the Step-Voltage and Induction Voltage Regulator WG.

New C57 numbers are requested for the combined revision of C57.12.22 & C57.12.26 and also for the Bar Coding project IEEE P1265.

4.10.3 Underground Transformers and Network Protectors - P. E. Orehek

Mr. C. G. Niemann has replaced Mr. J. W. Howard as Chair of the Underground-Type Three-Phase Distribution Transformers Working Group. Mr. D. H. Mulky has replaced Mr. R. B. Robertson as Chair of the Secondary Network Protectors Working Group.

We need to know the present status of C57.12.24, C57.12.40, and C57.12.44. NEMA is responsible for the first two. The third is not currently listed under either NEMA or IEEE responsibility. This will be discussed at the ANSI C57 meeting on Wednesday.

4.10.4 Insulation Life - L. W. Pierce

No activities to report.

4.10.5 Dry Type Transformers - W. Patterson

No activities to report.

4.10.6 Insulating Fluids - F. J. Gryszkiewicz

The Insulating Fluids Subcommittee is considering presenting a symposium (or tutorial) on the subject of water in insulating systems at the November 1995 Committee meeting in Boston. Mr. Harlow indicated that they would have to decide for certain on this presentation by the Spring meeting. Mr. Matthews suggested that Mr. Gryszkiewicz should let Mr. Skinger know in this regard.

4.10.7 Dielectric Tests - B. Poulin (representing J. B. Templeton)

No activities to report.

4.10.8 HVDC Converter Transformers & Reactors - W. N. Kennedy

No activities to report.

4.10.9 Bushings - L. B. Wagenaar

The Bushing Application Guide has been successfully balloted in the full Committee. Approval was requested, and received, to ballot the Committee for withdrawal of the present Bushing Loading Guide which has been incorporated into the Application Guide.

Two items which effect the ratings of bushings are draw-through bushing leads and current transformers, neither of which are under the scope of the Bushing Subcommittee. Discussion of this issue lead to the conclusion that the Bushing Subcommittee should first ballot proposals on these items within the Bushing Subcommittee, then proceed to ballot the other appropriate Subcommittee (draw-through leads to Performance Characteristics and current transformers to Instrument Transformers). The proposal concerning draw-through leads would then proceed to the Standards Subcommittee for balloting of the Combined Revisions to C57.12.00 in the full Committee.

4.10.10 Audible Sound and Vibration - Jeewan Puri

No activities to report. Mr. Puri asked if it is appropriate for Subcommittee Chairs to dress casually for the Wednesday meeting if they will not have time to change clothes before leaving the hotel. Mr. Harlow replied that the Committee has no dress code and anyone may dress as they feel appropriate.

4.10.11 West Coast - D. S. Brucker

Ed Hager and John Norberg are new Co-Chairs replacing Joe Watson on the Fire Protection Working Group. G. McCulla and E. Trummer are the Co-Chairs of the new Working Group on Phase Angle Shifting Transformers.

A request was made to add members E-mail Addresses to the Committee directory. This will be done prior to the next meeting.

No activities to report.

4.11 Vice Chair's Report - W. B. Binder, Jr.

Mr. Binder had mailed this report to all the Administrative Subcommittee members prior to the meeting. This report is included in the Committee minutes. He highlighted the following items on the activities of the PES Committees on which he serves as representative for the Transformers Committee:

- The PES Publication Guide has been modified and is available as part of the Author's Kit.
- A new Paper Review Form will be used for grading the Winter Power Meeting papers.
- Twenty papers have been received for the Transformers Committee to review for the 1995 Winter Power Meeting. Ten of these papers can be published. Each paper must be reviewed by four reviewers. Please urge all reviewers to respond on time.

- Panel Sessions must be planned well in advance. Plans for panel sessions are presently underway for 1996.

- The Organization and Procedures Committee is considering adoption of a uniform minimum practice regarding Standards Interpretations.

- We need to line up future Meeting Hosts for Fall 1996 and beyond. It has been suggested that we consider joint meetings with other technical committees or in conjunction with the general meetings.

We have received an offer from Edgar Trummer (Elin) to host a meeting in Austria. We could consider scheduling a meeting in Austria in conjunction with the Summer Power Meeting in Berlin in 1997. Dave Brucker also mentioned that the Seismic Working Group of the Substations Committee is interested in meeting in conjunction with other Technical Committees. It was agreed that they would be welcome to join us at our meeting in Kansas City.

4.12 Secretary's Report - J. W. Matthews

4.12.1 Membership Review

Three letters of resignation have been received since the last meeting. Ray Smith resigned from the voting membership and requested to remain on the role as an Emeritus Member. Maurice Frydman and Tom Balgie also resigned from the voting membership.

Henry Windisch recently passed away.

Following these changes, and prior to the addition of new members at this meeting, membership stands at:

Voting Members -	160	
Emeritus Members -	17	
Voting Classifications:	Producers -	67
	Users -	55
	General Interest -	38

4.12.2 New Member Applications

Membership applications have been received from the following persons for review at this meeting:

Glenn Andersen - Duke Power Co. (user)
Thomas Clark - Phoenix Electric Corp. (producer)
Michael A. Franchek - System Sales Representatives (producer)
Richard D. Graham - Hipotronics (general interest)
Michael E. Haas - ABB National Industry (producer)
Charles W. Johnson, Jr. - ABB Power T&D Co. (producer)
Michael Y. Lau - B. C. Hydro (user)
Peter G. Risse - Georgia Power Co. (user)
Edgar Trummer - Elin Transformatoren (producer)

Following these additions, membership stands at 169 voting members, with 72 producers, 58 users, and 39 general interest.

4.12.3 PES Directory Rosters

The galley proofs for the 1995 PES Directory were reviewed, updated, and forwarded to Ms. Nancy Heitmann, Manager of PES Special Services on September 23, 1994. Thank you to all Subcommittee and Working Group Chairs who were able to respond to my fast response request for these updates.

I would like to request all Chairs to submit a roster listing, formatted like the Directory, on the same diskette used to submit their Subcommittee minutes. This file should include all groups which are listed in the directory and would greatly simplify the task of Committee Directory updates.

4.12.4 Meeting Minutes

Minutes of the Dallas meeting were reproduced at a cost of $1,874.71 for 335 sets, which is $5.60 per set. Postage costs were $936.63 for 331 mailings, which averages $3.01 per mailing. The total cost was $2,811.34 and income from the 247 registrants was 2,470.00. I will attempt to reduce this cost so the $10 portion of the registration fee does not have to be increased.

I apologize for the late mailing of the Dallas minutes. To avert this problem in the future, I request the Subcommittee Chairs to submit their minutes within 30 days of the meeting (by November 1, 1994 for this meeting). The submittal should include a printed copy and an electronic file on a 3 1/2" diskette. The file should be formatted in Word 6.0 (or earlier version), WordPerfect 5.1, or text only, in order of preference.

Please note that the Dallas minutes were edited to the format of the IEEE Style Manual. No changes were made to the content of the reports except removal of the attendance lists. Please submit Subcommittee minutes in this format. I will provide an electronic copy of the Dallas minutes to anyone who requests it to aid in this process.

4.12.5 Attendance Statistics

The Attendance Statistics are included as Attachment 1 of the minutes. Please note that statistics are missing for many Working Groups and Task Forces. Please stress the significance of these statistics for the planning of our meetings. It is very difficult to choose a meeting place when the size requirements of the facilities are not known.

4.13 Old Business

4.13.1 Membership Requirements

Responses from other technical committees indicate that they have similar membership requirements to those of the Transformers Committee. There appears to be no need to change our present requirements.

4.13.2 New Working Group Chair Lunch

The first lunch meeting with new Working Group Chairs was held today. The logistics did not work well, but the purpose of the meeting was served. Luigi and Georges each made a presentation on conducting a working group; the standards development process and the administrative aspects of conducting a working group. This function will be continued at the next meeting with the new Working Group Chairs appointed at this meeting.

4.14 New Business

No new business items were presented.

4.15 Adjournment

There being no further business, Mr. Harlow adjourned the meeting at 10:34 p.m.

Respectfully submitted,

John W. Matthews, Secretary

IEEE Transformers Committee and ASC C57 Coordination Process

These procedures outline the coordination effort between the co-secretariats, IEEE and NEMA, of ASC C57.

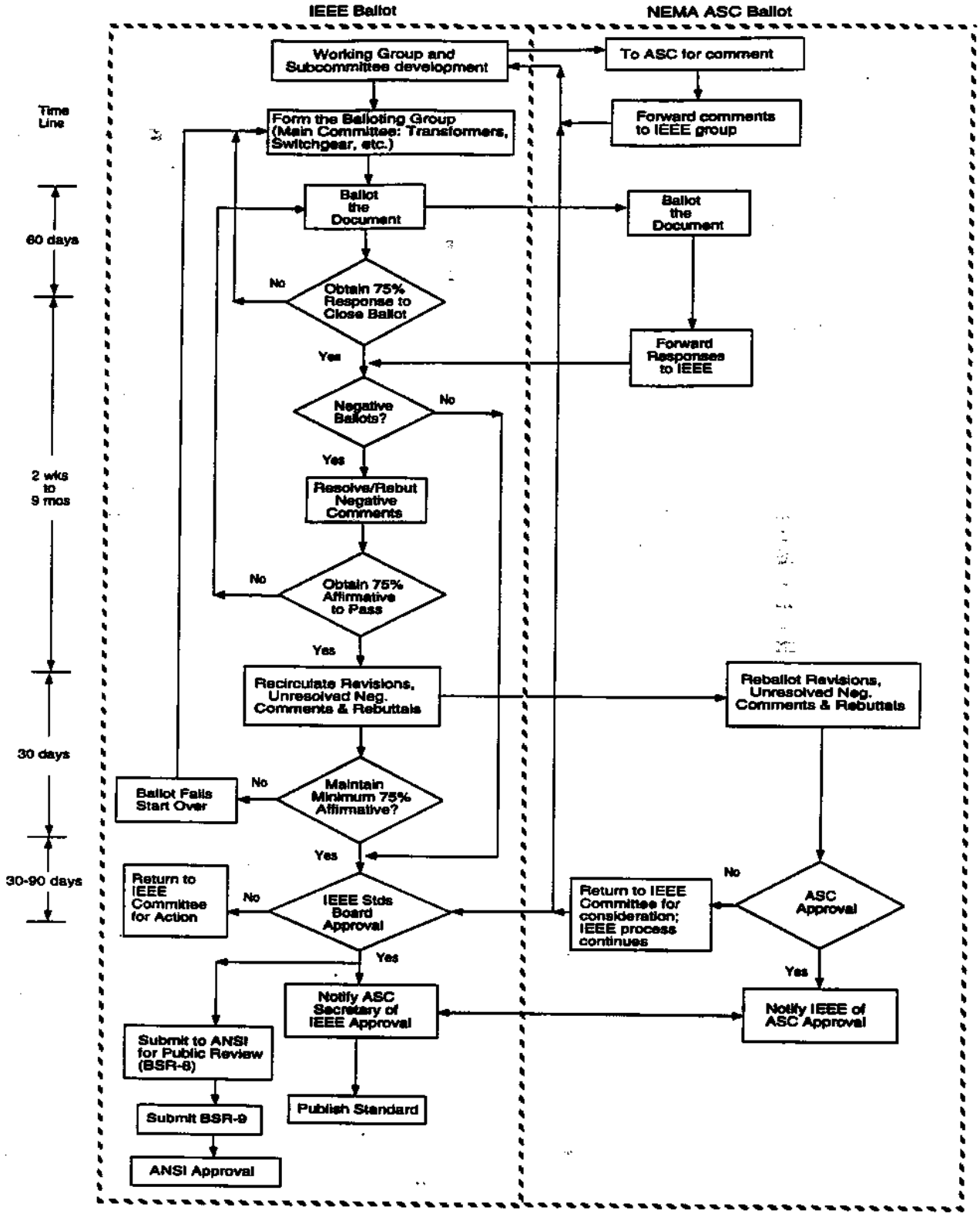
For standards which are developed by the IEEE Transformers Committee, the procedure will be as follows:

- The IEEE Transformers Committee will submit a Project Authorization Request (PAR) to the IEEE Standards Board.
- After IEEE Standards Board approval, IEEE staff submits PINS form to ANSI and notifies C57 Secretary of project initiation.
- Draft development proceeds (see attached flowchart). IEEE Working Group should coordinate informally with ASC C57 either by common membership, liaison, or circulation of drafts.
- When the draft is ready for ballot by the IEEE Transformers Committee (see attached flowchart), IEEE staff will conduct the ballot, simultaneously coordinating with ASC C57 (C57 Secretary provides regular updates of ASC C57 roster to IEEE). All comments and/or negatives will be forwarded to the Working Group Chair or designated contact for the Working Group to review and respond. A recirculation of negatives/responses or new drafts may be required.
- Upon successful ballot, the IEEE Transformers Committee will submit the draft to the IEEE Standards Board, in accordance with IEEE procedures, for approval. (The IEEE Transformers Committee ballot is independent of the ASC C57 ballot. Per the IEEE Operations Manual, a successful ballot requires a 75% return from the IEEE balloting group and documentation of attempts to coordinate with groups listed on the PAR, such as ASC C57.)
- Upon approval by the IEEE Standards Board, IEEE staff will submit BSR-8 form to ANSI and notify C57 Secretary. IEEE Editorial staff will professionally edit the draft and prepare it for publication. The standard will be published as soon as the editing process is complete. The BSR-9 form will be submitted to ANSI by IEEE staff once the public review period is over, so that the standard will be recognized as an American National Standard.

For standards originally developed by ASC C57 and now maintained by the IEEE Transformers Committee (C57.12.10/.13/.20/.21/.22/.23/.24/.25/.26/.27/.40/.50/.51/.52/.55 and .57), the procedure will be as follows:

- The IEEE Transformers Committee will submit a PAR to the IEEE Standards Board.
- After IEEE Standards Board approval, IEEE staff submits PINS form to ANSI and notifies C57 Secretary of project initiation.
- Draft development proceeds (see attached flowchart). IEEE Working Group should coordinate informally with ASC C57 either by common membership, liaison, or circulation of drafts.
- When the draft is ready for ballot by the IEEE Transformers Committee (see attached flowchart), IEEE staff will conduct the ballot of the IEEE Transformers Committee and send a copy to ASC C57 Secretary. ASC C57 Secretary ballots C57 Committee and forwards comments and/or negatives received to IEEE staff. All comments and/or negatives will be forwarded, by IEEE staff, to the Working Group Chair or designated contact for the Working Group to review and respond. A recirculation of negatives/responses or new drafts may be required.
- Upon successful ballot, the IEEE Transformers Committee will submit the draft to the IEEE Standards Board, in accordance with IEEE procedures, for approval.
- Upon approval by the IEEE Standards Board, IEEE staff will notify ASC C57 Secretary of the approval. ASC C57 Secretary submits BSR-8 form to ANSI. The BSR-9 form will be submitted to ANSI by the C57 Secretary once the public review period is over, so that the standard will be recognized as an American National Standard. ASC C57 Secretary will make appropriate arrangements for publication of document.

Co- Secretariat Simultaneous Balloting, C37, C57 for Standards Developed by IEEE Committees



1998-12-14

5.0 Transformers Standards - G. H. Vaillancourt

5.1 Transformers Standards and Co-ordination Activities

The transformers standards status is given in the four attachments:

Attachment 1 (11 pages) is a list, in numerical order, of all the C57 standards and others, including ten C57 standards for which our committee is not responsible, they are being listed here for the sake of completeness. Some standards are also listed more than once, this occurs when more than one group is working on the same standard, i.e. C57.12.00 and C57.12.90. There are in all, 105 projects listed.

Attachment 2 (3 pages) is a report of co-ordination activity on standards belonging to other PES Committees. This attachment is sorted by committee names.

Attachment 3 (1 page) is a list of Societies or PES Committees that have asked for co-ordination on the standards for which we are responsible.

Attachment 4 (22 pages) is sorted by subcommittee names. It contains a listing of the projects, and also co-ordination activity, for which a given subcommittee is responsible. The standards that are not assigned yet, or do not belong to the Transformers Committee, are listed under the Standards Subcommittee. For the publication of the Transformers Committee Minutes, this attachment will be split by subcommittee names, and each section will accompany, the corresponding subcommittee report.

5.2 Documents Submitted to Standards Board

5.2.1 NESCOM 06/14/94 (PAR's)

PC57.13 "Standard Requirements for Instrument Transformers" (Revision approved)

PC57.13.5 "Guide for Partial Discharge Measurements in Instrument Transformers 69 kV and Above" (New project approved). Sponsor now wants to change PAR.

PC57.13.6 "Requirements for Instrument Transformers for Use With Electronic Revenue Meters and Relays" (New project disapproved). Sponsor will have to explain how this differs from existing electronic revenue meter.

5.2.2 REVCOM 06/14/94 (Standards)

P259 "Standard Test Procedure for Evaluation of Systems of Insulation for Specialty Transformers". (Revision disapproved). PAR must first be changed to reflect title change.

5.2.3 NESCOM 09/21/94 (PAR's)

Nothing from Transformers Committee on agenda

5.2.4 REVCOM 09/21/94 (Standards)

P259 Will be discussed again under unfinished business.

C57.116 "Guide for Transformers Directly Connected to Generators". (Reaffirmation)

5.3 Standards Due for Reaffirmation, Revision, or Withdrawal Well Before December 1995

C57.21, C57.114

5.4 Par Submittals

There has been a lot of neglect in the submittal of project authorization requests (PAR's) over the last two years. We have now about 20 projects that need a PAR. Subcommittee chairmen are therefore urged to go over their list of standards and identify which ones require a PAR and take action on this as soon as possible. Delaying the submittal of the PAR will eventually lead into delays for the approval of your standards. Remember that PAR's have to be sent to me about two months in advance of the deadline date, so that they can be circulated through the other PES Committees. I must therefore get your PAR's before December 1, 1994 for submittal on time for the March 17, 1995 meeting.

5.5 Next Standards Board Meetings

Deadline for Submittal	Meeting Date
August 12, 1994	September 22, 1994
November 4, 1994	December 13, 1994
February 3, 1995	March 17, 1995

5.6 Standards Subcommittee Meeting

The Standards Subcommittee met in Milwaukee on September 27, 1994 with 12 people in attendance. After the usual introduction, the Minutes of the Dallas Meeting were approved as written. The revision procedure for C57.12.00 and C57.12.90 was kept the same as published in the Dallas Minutes.

The next item on the agenda was the working groups reports. The Working Group on Diagnostic Field Testing and Monitoring of Transformers had met on Monday, September 26, with 21 people in attendance. The chair of the working group, Mr. R. A. Veitch could not conduct the meeting due to a sudden illness. In his absence, the meeting was chaired by Mr. Vaillancourt. The meeting only lasted 45 minutes and all the time was spent discussing Draft 7 of Part I of IEEE P62, the Guide for Diagnostic Field Testing of Power Apparatus, Part I which covers oil-filled power transformers, regulators and reactors is currently being balloted in the PSIM Committee. The Transformers Committee is entitled to a vote on this document since it covers transformers. Due to Mr. Veitch's absence, no solid decision on the way the Transformers Committee should vote on it could be taken at that time. The meeting was adjourned at 9:15 A.M.

Next at the Standards Subcommittee Meeting, Mr. Vaillancourt gave again, a brief report on the progress of the PSIM Guide P62 and repeated much of what he had said the previous day. This time Mr. Veitch was present at the meeting and he reported that almost all of the comments that his Working Group had previously submitted to the PSIM Working Group revising P62, had been incorporated into Draft 7. He added that his working group is now almost completely

satisfied with the document and he would be personally in favour of an acceptance vote from the Transformers Committee.

Mr. Vaillancourt remarked that he is still not happy with clause 6.1.7 which deals with induced voltage test performed in the field, on the grounds that the complexity and the risks of doing that test in the field are not sufficiently emphazised. Also the test procedure is not explained thoroughly enough and the use of a series compensated voltage source is not even mentioned as an alternative to the parallel compensated one. Mr. Vaillancourt said that he will prepare a draft of proposed changes and he will forward it to Mr. Veitch along with his ballot recommendation on time to meet the ballot deadline.

Next, Mr. John Borst, the Chair of the Working Group on Continuous Revision of C57.12.00 reported that he has prepared a new PAR on the revision of the document, for submittal at the next Standards Board Meeting. Ms. Rochelle Stern of the IEEE Standards Department Editorial Staff had prepared for the Working Group a *red line edit* of the document to comply with the current editorial requirements. The goals of the Working Group during the next year will be as follows:

- Get the PAR approved for the Spring 1995 Meeting.

- Prepare a draft of the document in conformance with the latest revision of the Style Manual as marked by Rochelle Stern.

- Incorporate into that draft all the presently approved changes and new ones that will be provided by the responsible subcommittees before the Spring 1995 Meeting.

- Ballot the draft at the Transformers Committee level during the Summer of 1995.

- Submit the revised document to the Standards Board for approval before the end of 1995.

Mr. Steve Smith the chair of the Working Group on Continuous Revision of C57.12.90, also presented his report. He has also received a *red edit* copy of his standard from Rochelle Stern. He now also has diskettes of the text of the 1993 revision. Both, he and Nigel McQuin will prepare two separate PAR's to split into two documents the Test Code and the Guide for Short-Circuit Testing for Transformers, and also to revise both documents. The Test Code will be revised under the existing number but the Guide for Short-Circuit Testing will be given a new number. Mr. Smith also reported that during the last six months, he has reviewed the Test Code (C57.12.90 Part I) to establish Subcommittees responsibilities for revising individual clauses of the document. He found that the responsibilities for the technical content reside mainly within the scope of three of the Subcommittees. He has sent a letter to each corresponding Subcommittee Chair stating his area of concern in the standard. The goals of this Working Group over the next year besides splitting C57.12.90 into two parts will be the same as those stated above for the C57.12.00 Working Group.

Following this, responsibility for future revision of standards C57.70 and C57.80 was discussed. Mr. T. Traub has agreed to chair a new working group to revise these standards. The addition of this fourth working group will place an excessive workload on the shoulders of the Standards Subcommittee Chair, a vice-chair will need to be appointed before the next meeting in Kansas City.

There being no other new business, the meeting was adjourned at 9:15 A. M.

5.7 PES Standards Co-ordinating Committee Meeting

The Standards Coordinating Committee met, Monday, July 25, 1994 in San Francisco. Mr. Steve Diamond, a New Standard Committee (NESCOM) member, gave a presentation on Standard Development within the Computer Society. He reported on how the Computer Society has simplified procedures and policies for standards. During his presentation, he was blamed by the Nuclear Power Engineering Committee Representative, about the NESCOM decision of making further changes to the PAR form as detailed in their minutes of June 13, 1994. There would be about 15 changes, mostly additions to the PAR form. Mr. Lamont said that he does not understand why NESCOM wants to complicate further the PAR form, when the present PAR submittals continue to be incorrect.

Next, Ms. Anne O'Neill of the IEEE Standards Department gave an update on PES Vision for the Future - Standards Action Plan that continues to put the emphasis on the internationalization of standards. During her presentation, she announced that a brochure on the IEC Organization is now available for the technical committees members. Anyone interested in getting a copy should contact her at (908) 562-3852. She is also setting up a database of comparable IEEE and IEC standards. She handed out a preliminary list of these standards. The list included four Transformers Committee Standards that are partly equivalent or corresponding to IEC Standards. These are C57.12.00-1993 and C57.12.01-1989 that are similar to IEC 76-1-1976, C57.13-1993 that would correspond to IEC 185-1987 and IEC 186-1987, and C57.96-1989 that would partly correspond to IEC 76-2-1976. She also invited participation from anyone interested in helping her add to the database.

Following this, co-ordination of IEEE 62 was discussed once more, the chair Mr. Fred Kimsey, announced that an agreement in three points had been arrived at. The agreement stipulates that:

- PSIM will continue as the official sponsor of the document.
- All technical committees will be given the opportunity to provide liaison members.
- Each technical committee will have one unified vote on the particular section of concern.

The representative from the Electric Machine Committee said that his committee never agreed to this. The Transformers Committee representative remarked that one vote may not be sufficient since a document may still be accepted provided that the ballot is 75% positive. This means that for PART I, which covers transformers, PSIM has about 35 votes and the Transformers Committee has only one. This is odd since the transformer experts are for the majority, in the Transformers Committee. One possible solution to this would be to give the single vote, the force of veto. At the end, it was decided to wait and see what would happen with the committee ballot of Part I, and discuss this again at the next meeting.

Respectfully submitted,

G. H. Vaillancourt, Chair

5.8 Harmonizing of IEEE and IEC Standards - Luigi Napoli

Following the Standards Activities report by Mr. Vaillancourt, Luigi Napoli gave a presentation on the PES Standards Action Plan. The emphasis of this presentation, which was prepared by Anne O'Neill, is on the internationalization of standards. Details of the slide presentation are shown in Attachment 7.

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE

DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: STANDARDS / CHAIRPERSON: G. VAILLANCOURT / PHONE: (514)652-8515 / FAX: (514)652-8555

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.00	GENERAL REQUIREMENTS FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS							APPROVED BY ANSI 08/04/93
VARIOUS	CONTINUOUS REV. OF C57.12.00	BORST J. D.		06/16/93	/ /	1998	(314)659-6119	NEW WORKING GROUP FORMED
C57.12.10	TRANSFORMERS 230kV AND BELOW -8333/10417kVA 1 PH, -100000 kVA 3 PH w/o LTC, -100000kVA w/ LTC - SAFETY REQUIREMENTS							TRANSFERRED TO IEEE
ANSI	ANSI C57.12.1			06/04/87	/ /	1993		NEEDS A HOME, DUE FOR REAF.
C57.12.13	CONFORMANCE REQUIREMENTS FOR LIQUID-FILLED TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS							ASSIGN TO SUBCOMMITTEE
ANSI	HVACC ON HIGH VOLTAGE TRANSFO			09/02/81	/ /	1987		NEMA STANDARD
C57.12.53	REQUIREMENTS FOR DRY-TYPE, UNDERGROUND, SINGLE-PHASE WITH SEPARABLE INSULATED H-V 24940 grdY/14400 V AND <; LV 240/120 V							NEW STANDARD (NO PAR)
ANSI				/ /	/ /	0		NOBODY IS WORKING ON IT
C57.12.54	REQUIREMENTS FOR DRY-TYPE, UNDERGROUND 3 PHASE DISTRIBUTION TRANSFORMERS,2500 kVA OR <, HV 24940 grdY/14400 OR <,LV 480V							NEED TRANSFER TO IEEE
ANSI				/ /	/ /	0		NOT IEEE STANDARD
C57.12.70	TERMINAL MARKINGS AND CONNECTIONS FOR DIST. & POWER TRANSFORMERS							ANSI APPROVED 07/09/93
NONE	TERMINOLOY AND MARKING	TRAUB T. P.		06/18/92	/ /	1997	(312)394-2704	TO REVISE TERMINOLOGY
C57.12.80	TERMINOLOGY FOR POWER & DISTRIBUTION TRANSFORMERS							WILL START REVISION
NONE	TERMINOLOGY AND MARKING	TRAUB T. P.		05/01/92	/ /	1997	(312)394-2704	APPROVED BY ANSI 12/02/92
C57.12.90	STANDARD TEST CODE FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS & GUIDE FOR SC TESTING OF							NEW WORKING GROUP FORMED
VARIOUS	CONTINUOUS REV. OF C57.12.90	SMITH S. D.		03/16/93	/ /	1998	(606)879-2757	APPROVED BY ANSI 08/19/94
C57.17	REQUIREMENTS FOR ARC FURNACE TRANSFORMERS							LAST REVISED IN 1986
ANSI	ANSI DOCUMENT			/ /	/ /	1986		ANSI DOCUMENT

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: STANDARDS / CHAIRPERSON: G. VAILLANCOURT / PHONE: (514)652-8515 / FAX: (514)652-8555

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION: PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.99 / P731	GUIDE FOR LOADING DRY-TYPE AND OIL-IMMERSED CURRENT-LIMITING REACTORS			/ /	03/28/78	1990		NEEDS REVISION / NOT IEEE STANDARD

COORDINATION ACTIVITY OF STANDARDS SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE	PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD. PHONE
NEW / 03/04/94	GUIDE FOR VOLTAGE AND PHASING DETECTORS FOR USE IN HV SYSTEMS IN ELECTRIC POWER UTILITIES	PSIM	PETER H. REYNOLDS	215-646-9200	G. H. VAILLANCOURT	514-652-8515
P 62 / 03/17/94	GUIDE FOR DIAGNOSTIC OF POWER APPARATUS	PSIM	DAVID TRAIN	617-926-4900	R. A. VEITCH	COMMITTEE BALLOT OF D7 / 905-731-9178
P 454 / 03/31/94	PARTIAL DISCHARGE MEASUREMENTS	PSIM	BARRY WARD	215-646-9200	G. H. VAILLANCOURT	WILL ADOPT IEC-270 / 514-652-8515
P1291 / 10/22/91	GUIDE FOR PARTIAL DISCHARGE MEASUREMENTS IN POWER SWITCHGEAR	SWGR	E. F. VEVERKA	414-835-1544	G. H. VAILLANCOURT	ANSI APPROVED 08/30/93 / 514-652-8515
P1325 / 03/17/92	RECOMMENDED PRACTICE FOR REPORTING FIELD TROUBLE DATA FOR POWER CIRCUIT BREAKERS	SWGR	D. M. LARSON	203-634-5739	G. H. VAILLANCOURT	INFORMATION COPY REQUESTED / 514-652-8515

6.0 Recognition and Awards - J. D. Borst

6.1 Certificates of Appreciation

Certificates of Appreciation will be presented to the following individuals at the Transformers Committee meeting on September 28, 1994:

Jerry C. Thompson	Chair, Distribution Transformers Subcommittee
Jerry C. Thompson	Chair, C57.12.20 Working Group
Ken S. Hanus	Chair, C57.12.22 Working Group
Gerry A. Paiva	Chair, C57.12.26 Working Group
David S. Lyon	Chair, Electronic Data Transfer Working Group

We congratulate these individuals for their contributions and leadership.

6.2 IEEE Standards Department

The IEEE Standards Board has issued a Working Group Chair Award to Bipin K. Patel for his contribution in developing IEEE Guide C57.109-1993. This award will be presented at the September 28, 1994 Transformers Committee meeting. We congratulate Bipin for his contributions and leadership.

6.3 IEEE PES Awards Committee

No update available.

John D. Borst
Chair, Awards Subcommittee

7.0 Reports of Technical Subcommittees

The following reports are those of the technical subcommittees of the Transformers Committee. In most cases they are the complete minutes of meetings held earlier and they are identified as minutes. Some are summary reports of the Subcommittee activities during the previous week.

Secretary's Note: The subcommittee reports have been edited to the format of the IEEE Style Manual. No changes have been made to the content of these reports except removal of attendance lists.

Following each report is a listing of the current status of each of the subcommittee's assigned standards.

7.1 Distribution Transformers - K. S. Hanus

Milwaukee, WI
Tuesday, September 27, 1994

7.1.1 Chair's Remarks & Announcements

The meeting convened at 2:00 PM in the Grand Ballroom West with the introduction of the members and guests and signing of the attendance roster.

Minutes of the last meeting in Dallas, TX were approved with no changes.

The chair covered key points of the ADCOM meeting from the evening before. The key points were:

272 registered w/46 spouses

Next meeting: Kansas City, April 23-27, Hyatt Regency Crown Center Complex, $90 Sgl/Dbl

Other Meetings:
Fall 95 - Boston, Nov. 5-8, Marriott $140
Spring 96 - San Francisco, April 13-17

The committee is looking for Fall 1996 and on volunteers.

The following persons were approved as working group chairpersons: Angie McCain, Tom Diamantis, Craig Colopy

Metrification- The issue of metrification was discussed with a decision to show English values with the metric equivalent in parentheses.

Several requests for interpretation of standards have been received. These requests should be responded to quickly and care should given to reply to a true request for interpretation of particular verbiage but requests that are not really asking for an interpretation of existing verbiage should be assumed to be a comment for consideration by the working group.

The assignment of C57 numbers to new documents is to be done by George Vaillancourt.

Deadline for submitting revised or new standards to the next standards board meeting is November 4, 1994 for the December 13, 1994 meeting. PARs for the March 17, 1995 Standards Board meeting should be sent to George Vaillancourt by December 1, 1994.

Glenn Andersen's application for membership in the main committee was approved. Membership requirements were reviewed.

7.1.2 A report from each of the working group chairpersons was given.

.20 Polemount Transformers

The current document has a 1988 date and has been successfully balloted at the Distribution Transformers Subcommittee and EEI T&D levels. The draft IV is now being balloted at the IEEE PES Transformers committee and C57 Main levels.

The negative ballots from the EEI T&D ballot were discussed and WG recommendations were developed in response to the negatives. Items brought up in the negatives included allowance of aluminum conductors in solderless terminals, angle of tilt, SI conversions, and editorial notations in the figures and tables. These will be incorporated into the next revision of the document.

A draft I for the next revision cycle was passed out and a report on the consolidation of the information in the figures and tables was given to the WG. The task force is 50% complete with this consolidation which when completed will remove the redundant information among the tables and figures.

.21 Single Phase Livefront Transformers

The C57 12.21 document has been approved by the Standards Board and the ANSI Board of Standards Review. It is now awaiting publishing by ANSI.

.22 Three Phase Padmount Transformers

The C57 12.22 document requires resolution of 2 negative ballots prior to submittal to the Standards Board. Negative votes on the C57 12.22 document need to be resolved concerning the 125 kV BIL and 150 kV BIL issues. The negatives were rejected by the WG and per IEEE policy the negatives and there response have to be re-circulated for members to have a chance to change there votes. It will then be submitted to the Standards Board.

.23 Single Phase Submersible Transformers

The C57 12.23 document has been approved by the ANSI Board of Standards Review and is now awaiting publication by ANSI.

.25 Single Phase Padmount Deadfront Transformers

The WG heard the report of the task force trying to resolve the cabinet depth issue. The task force showed a video tape of an actual field mockup of a transformer installation at a WEPCO training facility, which depicted the problems the current standard has with clearances of secondary terminals to the cabinet, interference of primary cables with secondary cables and terminals. After much discussion it was decided the WG needed to determine which components (or accessories) which the standard must consider in the development of cabinet minimum dimensions. The manufacturers will provide certain dimensional information of what is being supplied to help determine users needs.

.22 & .26 (Combination of) for Three Phase Padmount Transformers

The WG reviewed a task force report covering the results of a survey on transformer impedance ranges for units 500 kVA and below. The survey indicated the minimum impedance is driven by limiting available short circuit currents to customers, especially in changeout situations. An Additional survey

will be performed to gather enough information to revise the impedance requirements to what will be useful to users. This is in response to comments received on past document ballots.

The WG discussed the option of assigning the "combination" document a new number or keeping the C57.12.26 number. A motion was passed to assign a new C57.12.xx number.

.26 Three Phase Padmount Deadfront Transformers

The C57 12.26 document has been approved by the ANSI Board of Standards Review. It is now awaiting publishing by ANSI.

P1265 Bar Coding

The Draft 5 was successfully balloted at the subcommittee and EEI T&D level. The draft is now being submitted for balloting at the transformers committee level and has been sent to NEMA for review at the C57 Main level.

The WG discussed the assigning of a C57.12.xx number to the document before it is published. It was decided this should be done.

P1388 Electronic Data Transmittal

A preliminary draft I was distributed at the meeting. The three major issues that were discussed were:

* Two sets of data requirements alternatives: a standard set and an extended set.
* Two file format alternatives: a flat ASCII file and an EDI file
* Two data transmission alternatives: mail (diskette) and telecommunications

The WG reviewed an EEI survey on this matter along with a CSA standard which addresses a standard test report data set.

Coating Integrity Documents (.28, .29, .30 & .31)

.29 The coastal environment enclosure integrity standards has been published.

.28 The padmount enclosure document is currently being balloted in the WG and should receive approval and after which it will be sent to the ANSI C57 Main committee for balloting.

.31 The polemount document is in the final review stages in the WG and should be following the WG and C57 Main balloting like .28.

.32 The submersible document is being balloted by the C57 Main committee. Any negatives will be resolved at the next meeting and then forwarded for publication.

Loss Evaluation Guide

The working group met with 57 members and guests attending. NEMA activities with the DOE regarding this and other related subjects were relayed to the WG. Persons from Oakridge Labs covered there involvement in providing the DOE with the necessary studies and information required by the Energy Efficiency Act. They stated the approach they are taking is to provide minimum efficiency requirements in conjunction with a TOC methodology. For users which do not evaluate the minimum efficiencies would bring about compliance and for those who perform TOC calculations, these calculations would determine transformer efficiencies.

A draft I was passed out and the WG is asked to review it and provide comments in the next 60-90 days. Also a PAR will be submitted in the next 30 days.

C57.15 Step-Voltage and Induction-Voltage Regulators

This was the first meeting of the WG. The current document carries a 1986 date. The chair stated the document needs to be updated to reflect the provisions of C57.12.00 and C57.12.90.

The WG continued to discuss the three major areas the document needs to be updated on. These include sealed vs. breather type units, 55 deg C vs. 65 deg C ratings and whether the document should continue to cover induction-voltage regulators. It was the opinion of the group the induction type regulators are no longer valid and used or produced.

7.1.3 New Business

Co-Secretariat duties of NEMA & IEEE- A flow chart showing the process a document goes through from development to final approval a standard or guide was discussed. The copy handed out at the meeting was an older version and a newer version is attached to these minutes. The flow chart shows the responsibilities of NEMA and IEEE with regards to the secretariat responsibilities.

7.1.4 Working group assignments

The current assignments are as follows:

.20 Glenn Andersen / Allen Wilks
.21 Ali Ghafourian
.22 Ken Haraus
.23 Bob Scheu
.25 John Lazar / Norvin Mohesky
.26 Gerry Paiva
EDT David Rollins/Angie McCain
Bar Coding Ron Jordan / Ed Smith
Loss Evaluation Guide Tom Pekarek/Don Duckett
Combination .22&.26 Clyde Pearson/Ron Stahara
57.15 Tom Diamantis/Craig Colopy

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: DISTRIBUTION TRANSFORMERS / CHAIRPERSON: KEN HANUS / PHONE: (817)882-6020 / FAX: (817)882-6038

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION	PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.20	OVERHEAD-TYPE DISTRIBUTION TRANSFORMERS, 500 kVA AND SMALLER: H V 34500 VOLTS AND BELOW, L V 7970/13800Y & BELOW			T&D IAS/REP SCC14					PAR APPROVED BY NESCOM
PC57.12.20	POLE MOUNTED DISTRIBUTION TR	ANDERSON G. W.			01/11/88	12/05/91	1993	(913)339-2931	BALLOTING SUBCOMM.
C57.12.21	STANDARD REQUIREMENTS FOR PAD-MOUNTED, COMPARTMENTAL-TYPE, SELF-COOLED, SINGLE-PHASE DIST TRANSFORMERS WITH HV BUSHINGS			T&D IAS/REP					APPROVED BY ANSI
PC57.12.21	3-PHASE PADMOUNT TR LIVE FRONT	GHAFOURIAN A.			10/22/79	06/27/91	1985	(601)796-4255	COPYRIGHT NOT RELEASED
C57.12.22	PAD-MOUNTED,COMPARTMENTAL-TYPE SELF-COOLED,3-PHASE DIST. TR WITH HV BUSHINGS,2500kVA AND SMALLER:...REQUIREMENTS.			T&D IAS/REP IAS/PSE					AWAITING ANSI APPROVAL
PC57.12.22	3 PHASE PADMOUNT TR LIVE FRONT	HANUS K.			05/10/89	06/27/91	1994	(817)882-6025	WILL HAVE NEW NUMBER
C57.12.23	UNDERGROUND-TYPE,SELF-COOLED, 1-PHASE DISTRIBUTION TR WITH SEPERABLE INSULATED HV CONNECT HV 24940GrdY..LV,240..;167kVA.			T&D IC IAS/REP IAS/PSE					ANSI APPROVED 02/18/94
PC57.12.23	1-PHASE SUBMERSIBLE TR	PAIVA G.			09/19/85	06/27/91	1996	(816)302-8409	TO BE PUBLISHED BY ANSI
C57.12.25	REQUIREMENTS FOR PAD-MOUNTED COMP-TYPE,SELF-COOLED,1-PHASE DISTRIBUTION TR W/SEP INS HV CONN,HV 34500GrdY...167kVA...			T&D IC IAS/REP IAS/PSE					WORKING ON DRAFT 1
PC57.12.25	1-PHASE PADMOUNT TR DEADFRONT	MOHESKY N.			05/11/90	06/27/91	1995	(314)239-6783	COPYRIGHT NOT RELEASED
C57.12.26	PAD-MOUNTED COMPARTMENTAL-TYPE SELF-COOLED,3-PHASE DIST TR for USE W/ SEPERABLE INSULATED HV CONN.,HV 34500GrdY..2500kVA			T&D IC IAS/REP IAS/PSE SCC14					WILL HAVE NEW NUMBER
PC57.12.26	3-PHASE PADMOUNT TR DEADFRONT	PEARSON L. C.			06/17/92	12/05/91	1997	(817)882-6025	APPROVED BY ANSI
C57.12.28	PAD-MOUNTED EQUIPMENT - ENCLOSURE INTEGRITY								EXTENSION TO BE REQUESTED
ANSI	JOINT WG ON CABINET INTEGRITY	MARTIN J.			06/24/87	/ /	1994		BEING BALLOTED IN WG
C57.12.29	PAD-MOUNTED EQUIPMENT - ENCLOSURE INTEGRITY IN COASTAL ENVIRONMENTS								PUBLISHED IN 1992
ANSI	JOINT WG ON CABINET INTEGRITY	MARTIN J.			/ /	/ /	1996		NOT TRANSFORMERS COMM.
C57.12.30	SUBMERSIBLE EQUIPMENT - ENCLOSURE INTEGRITY								TO BE BALLOTED
ANSI	JOINT WG ON CABINET INTEGRITY	MARTIN J.			/ /	/ /	1994		NUMBER TO BE CHANGED

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: DISTRIBUTION TRANSFORMERS / CHAIRPERSON: KEN HANUS / PHONE: (817)882-6020 / FAX: (817)882-6038

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION: PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.31	COATING STANDARD FOR POLE MOUNTED TRANSFORMERS							PAR TO BE SUBMITTED
ANSI	JOINT WG ON CABINET INTEGRITY	MARTIN J.		/ /	/ /	1994		EXPECT TO COMPLETE BY 12/94
C57.12.32								
ANSI				/ /	/ /	0		
C57.15	REQUIREMENTS, TERMINOLOGY, & TEST CODE FOR STEP-VOLTAGE AND INDUCTION VOLTAGE REGULATORS							WG REVISING SCOPE
NONE	VOLTAGE REGULATORS C57.15	DIAMANTIS T.		03/18/87	06/19/86	1997	(315)428-5741	APPROVED BY ANSI 12/02/92
IEEE1265	STANDARD FOR BAR CODING FOR DISTRIBUTION TRANSFORMERS (POLE-MOUNTED, PAD-MOUNTED AND UNDERGROUND)			AIM/TSC	IAS/REP TD	EEI	NEMA	PAR APPROVED 06/27/91
P1265	BAR CODE STANDARD	JORDAN RON		/ /	06/27/91	1994	(619)482-3239	TO BALLOT D5
IEEE1388	STANDARD FOR THE ELECTRONIC REPORTING OF TRANSFORMER TEST DATA			EEI	NEMA	ASC X12 PSR	C9 SAB	PREPARING D1
P1388	ELECTRONIC TEST DATA	McCAIN A.		/ /	09/15/93	0	(410)291-3231	NO. CHANGED FROM C57.132
NEW	LOSS EVALUATION GUIDE FOR DISTRIBUTION TRANSFORMERS							NEW WORKING GROUP
NEW	LOSS EVALUATION IN DIST. TRANS	DUCKETT D.		/ /	/ /	0	(704)462-3114	PAR NEEDED

7.2 Dry-Type Transformers - W. F. Patterson

IEEE/PES TRANSFORMERS COMMITTEE

DRY TYPE TRANSFORMER SUBCOMMITTEE MEETING MINUTES

MILWAUKEE, WI - SEPT. 25-28, 1994

7.2.1 Chair's Remarks and Announcements

Introductions were made and the attendance roster was circulated.

First order of business was approval of the minutes from March 22, 1994. Motion was made to approve them as written; seconded and passed.

7.2.2 Working Group Reports

The next order of business was the presentation of the reports of the various working groups. Due to scheduling conflicts, Mr. Provost actually conducted his WG meeting as the first presentation during the Subcommittee meeting. See the following sections for the individual reports:

7.2.2.1	Thermal Evaluation & Flammability	R. Provost
7.2.2.2	Cast Coil Loading Guide	L. Pierce
7.2.2.3	Dry Type Reactors - HVDC Smoothing	R. Dudley
7.2.2.4	Dry Type Reactors - Current Limiting	R. Dudley
7.2.2.5	Test Code Revision	D. Barnard
7.2.2.6	Specialty Transformers	R. Simpson
7.2.2.7	Hot Spot Differentials	P. Payne
7.2.2.8	General Requirements Revision	A. Jonnatti

The Chairmen discussed the ballot to reaffirm C57.96 - Loading Guide. There were 2 negative votes. Mr. L. Pierce disagreed with the document based on it's underlying hot spot/average rise concepts. These issues are currently under review by various WG's within the Subcommittee. Mr. Pierce agreed to Chair a WG to resolve these issues within C57.96 following his current activity to produce a Part B to C57.96. Based on this, he agreed to withdraw his negative vote. The other negative, from P. Payne, was basically editorial. Ms. Payne agreed to withdraw her negative based on her comments being incorporated in the next revision of the document.

Following Mr. Dudley's presentation, the status of C57.99 - Loading Guide for Current Limiting Reactors was discussed. Following the discussion, it was decided that this document should be allowed to expire as it is no longer appropriate

Mr. Simpson was unable to present the minuets of the WG on Specialty Transformers. His minutes were presented to the Subcommittee by the Chair. See Section below.

During the Hot Spot Differential presentation by Ms. Payne, a discussion ensued on where (in which standard or guide) a test method for determining a hot spot differential should reside. Following considerable discussion it was decided that a separate Guide needs to be developed for establishing a common methodology for measuring hot spot differentials. Ms. Payne agreed to

Chair a WG to develop this Guide. She will develop a PAR for this WG for the Kansas City meeting. This WG will proceed after Ms. Payne's current WG is completed.

The Chair reported that the ballot on C57.12.59 was successful with no negatives. Some comments were received - many editorial. It was agreed that since minor changes cannot be incorporated in a Reaffirmation Ballot, the Chair will incorporate the changes in about a year, ballot the Subcommittee, then ballot the Transformers Committee.

The Chair noted that the C57.12.5 series needs to be balloted for Reaffirmation (12.50,12.51,12.52,12.55 within the Dry Type Subcommittee). The Subcommittee agreed to proceed with the reaffirmation vote.

The Chair noted a number of issues discussed at the Administrative Subcommittee meeting:

- metric units should be used wherever possible
- standards require a ballot to be withdrawn but no action is required to allow it to expire
- IEEE Discussion Forum can be used for WG meetings
- IEEE members cannot give individual 'interpretations' of IEEE standards

The meeting was adjourned at 3:45 PM.

7.2.2.1 Working Group on Thermal Evaluation of Dry Type Transformers
Working Group on Flammability Issues

Chair: Mr. Richard Provost

Dick's group had a conflict with A. Jonnatti's this morning so the meeting was held during the Dry Type Subcommittee meeting.

The Chair reported that the working group did not meet in Dallas however there was a ballot sent out to working group in February on C57.12.60. There were basically three questions on the ballot. Based on the fact that no work had been brought forward to the working group based on the standard for at least a two year period, the proposal was made that the document be submitted for reaffirmation as a trial use standard with the intent to move forward and revise the standard to make it more usable as a more useful document. There were 12 ballots mailed out; 8 returned which was under the 75% minimum. Nonetheless 8 voted yes to reaffirmation and none against. The second question was related to changing the trial use standard to a guide; again of the eight responses, 7 were positive and one negative. The last questions revolved around forming a task force to do new work on the document; four volunteers from that ballot to work on it as a task force.

Addressing the first point, it was questioned, given less than 75% return of the WG ballot, if they could go ahead with a ballot of the Subcommittee? It was decided to proceed with a ballot of the subcommittee and the transformer committee for reaffirmation with intent to modify document. As far as the issue around the trial use standard versus the guide, the Chair noted there will be substantial changes to the document and it is probably premature to go forward with that question. The WG will move forward with the modifications and at some later point will make a decision whether it be a guide or a standard.

On Sunday, the first task force meeting on C57.12.60 was held in the hotel in Milwaukee. Copies of the general minutes were passed around. Eight (8) individuals met for the task force for 3 1/2 hours in the Board room. Three areas were addressed for potential change and modifications in the document: the Model Description, the Criteria of Failure and the Methods of Test.

MODEL DESCRIPTION Section 3.2 on page 4 of C57.12.60:

Jeewan Puri of Square D has proposed a simplified model to be used as an alternate to using full sized coils. The way the document is written today it does not really specify a model design per se. He put forward a proposal to make a design which would be small in size, light in weight, easy to assemble and economical to use for this type of testing where many multiples of coils will have to be made and destroyed.

There was a considerable discussion around this. Basically it ended up where a decision was made that two individuals (Jeewan Puri & Mike Haas) have agreed to re-write section 3.2 around test models to include two separate approaches; one being a full coil approach and the other being a small coil test model. These will be included with diagrams where possible and they claimed to have a draft ready by the end of November.

CRITERIA OF FAILURE:

The current document utilizes a number of dielectric tests which are used to determine failure of the coil in one of several design modes; including impulse testing, simulated impulse test and/or induced or applied voltage test.

Tony Jonnatti renewed an earlier proposal he had made regarding additional failure tests which might be the determination of partial discharge of the coil. Basically the coil model would be designed to be essentially free of partial discharge to start with and then during the heating cycle it would be tested for possible discharge which would be based on some agreed upon established level for example today's CSA level such as 50 pico-coulombs. After some discussion, it was decided that Tony would write a new section to the subject; section 3.8.4 or method C per se which would allow us time to test procedures.

METHODS OF TESTS:

Some discussion was made on method "A" regarding the transient voltage analysis discussion within the document and the concerns of the probes which are suggested in the document which would change the voltage distribution within the coil A proposal was made to establish some alternative approach. Again, J. Puri has volunteered to work on this in addition to several others members: Mike Schacker, Tony Jonnatti as well as Richard Provost. The goal for all of the above modifications is basically to have everything ready by the end of the year so that sometime early next year we will be prepared to issue a modified document to the working group for a ballot and for comments.

Chair requested that Mike Shacker of UL provide an official review and response of all these proposals by UL and to also provide the task force any pertinent information which UL might have around previous testing attempts based on this document. It might be helpful in making this document more useable and effective for the future.

The task force was adjourned with the intent of reviewing the new draft modifications in early January. The Chair would like to express his appreciation and gratitude to the task force members for devoting their Sunday afternoon to this meeting.

The chair gladly welcomed Mike Schacker of UL and Peter Clark of Dynapower as new members of the working group.

See the Dry Type Subcommittee Attendance Roster for the attendance of this WG meeting.

7.2.2.2 Working Group on Cast Coil Resin Transformers Loading Guide

Chair: Mr. Linden Pierce

This working group was created to investigate loading guide criteria unique to cast coils for inclusion in the Dry Type Loading Guide C57.96.

The Working Group met September 27, with 11 members and 5 guests in attendance.

The minutes of the March 22, 1994 meeting in Dallas were approved.

Ballot results of Draft 3.0 for the Dry Type Subcommittee and the working group were reviewed. One negative ballot was received from Jerry Frank and was resolved by omitting the following sentence "Imbedding the coil conductors in epoxy help prevents movement of winding conductors which would lead to failure of other transformer types under these conditions".

Comment from Rick Marek regarding some language in 4.0 and the forward. It was agreed to leave them the way it is. Comment by Bill Simpson to use IEC insulation classes. This was not accepted because C57.12.01 is the document that should be changed. Comment from John Sullivan to define Pulse K in Figure 3 was adopted. The Chair will clarify and define these in the next draft.

Other typographical errors etc. will be corrected and definitions of exponent and time constant will be included. Next step will be to make revisions and ballot transformer committee.

The meeting adjourned.

7.2.2.3 Working Group on Dry Type Reactors - TF Smoothing Reactors

Chair: Mr. Richard Dudley

Ref: Dry Type HVDC Smoothing Reactors

The Dry Type Air Core HVDC Smoothing Reactor Task Force met on September 26, 1994 at 8:00 a.m. There were 7 members and 3 guests present. One guest Lars-Erik Juhlin of ABB Power Systems requested membership. The following are the highlights of the meeting:

The attendance list was circulated.

The minutes of the previous meeting were approved.

Pollution considerations for the support insulators of dry-type smoothing reactors were discussed.

In the case of D.C. equipment no definitive consensus has been reached re: definitions of levels and testing. It was suggested and accepted that the wording in the D.C. bushing standard under preparation be used. This statement includes a reference to an IEC report which is the most current document on the subject of pollution and D.C. equipment.

The effect of pollution on dry-type air core smoothing reactors was discussed. It was pointed out that because they are high D.C. potential they attract pollution like other energized equipment in a D.C. yard, on an electrostatic precipitator principle. Questions were asked about the effect of pollution on BIL etc. and is there any need for tests to simulate this situation. The chair and others pointed out that line fault tests had been carried out on many DC projects after the equipment had been installed and pollution had accumulated on the equipment; no problems had occurred. Klaus Papp and Lars-Erik Julin said they would provide performance data at the next task force meeting.

Insulation coordination practice for HVDC smoothing reactors was discussed. Pierre Riffon pointed out that it is common practice to retest power transformers after repair in service at 80% of ex-factory BIL. This is to allow margin of aging of equipment. In the case of AC transformers etc. this is a good practice as the typical protective margin used to select LA's is greater than 30% and hence tested at 80% of exfactor BIL is still over the protective level of the LA. However protective margins for LA applied to DC equipment is typically selected at 15% switching and 20% lightning. Therefore protective margin practice must be changed or dielectric testing after repairs should be carried out at 100%. Dr. Stein thought this was too severe and that a test at 90% might be reasonable as it would account for aging but still be above the LA protection level. Pierre Riffon suggested testing at the LA protective level increased by a factor of say 1.05. It was agreed to check what will be the practice for converter transformers before a decision is made for smoothing reactors.

A discussion took place on a rationalization of the test code for oil immersed and dry type smoothing reactors. It was agreed that measurement of D.C. resistance and losses was equally applicable. Demonstration of linearity of inductance with current was only relevant to oil immersed units. The remainder of the time was spent discussing the DC power test which is currently only required for dry type smoothing reactors. The purpose of the test is to detect broken conductors or bad connections as such it was suggested that the test could equally apply to oil immersed units. However it was suggested that testing adds costs and if this test is strictly a quality check, should the problem of a broken conductor or bad connection be found by another test during manufacturing such as a resistance or continuity check? Such a test would be part of an inspection test plan but would not be part of a final test performance.

The meeting adjourned at 9:13 a.m. Discussion on the above subjects will have to continue and all members are requested to bring any inputs prior to that next meeting.

7.2.2.4 Working Group on Dry Type Reactors - C57.16

Chair: Mr. Richard Dudley

The Dry-Type Reactor WG met on September 26, 1994 at 2:50 PM in the Henry VIII Room of the Pfister Hotel in Milwaukee, WI. There were 9 members present and 3 guests present. Two guests requested membership The following are the highlights of the meeting:

The attendance list was circulated.

The minutes of the Dallas meeting were approved.

The comments from the balloting of D8 were discussed. To date only 30 ballots out of 50 have been received. Highlights of discussion comments received with negative ballots or approved with comments are as follows:

Guy Polovick's comments on his "approved with comments" ballot were editorial and accepted.

Guy Polovick's "approved with comments" ballot had one non electrical comment that was not accepted. It was felt that it was critical to reference standards by number and date as the referenced information would change in a revision.

Jerome Frank's comment on his negative ballot was not accepted. The use of K in Table 6 comes from C57.12.00 and should be kept to be consistent. The Chair will contact him once this is confirmed.

Pierre Riffon's comments on his negative ballot were reviewed.

-4.1.2

.....5) exposure to temperatures outside the range of -40° to +40°C.

-11.5.7.1

C= (TK + 30)/(TK + Theta)

-11.6.4

Paragraph one will be revised to specify a routine inductance and loss measurement before and after short circuit testing. A routine dielectric test at 100% of specified voltage will be carried out after the short circuit test. A second paragraph as submitted on usual inspections will be added.

-Editorial comments were accepted and will be included in the next draft.

Klaus Papp's comments on his approved ballot were discussed and were accepted or modified as follows:

-"Duty" will be used throughout the standard and "duty cycle", "load cycle" will be eliminated. e.g. Table 4, clause 2.4.5 etc.

-2.3.3.3 will be added and a definition for "short time over current rating" and will be defined in terms of magnitude and duration of current; the magnitude being greater than the continuous rating.

-2.4.2 - External Insulation. The primary external insulation in dry type air core series reactors is the accepted insulation; phase to ground or phase to phase.

-2.4.3 and 2.4.4 will be rewritten to add further clarification.

-2.4.6 - The last sentence will be eliminated

-7.2.5.. guaranteed value. It should be recognized that single line to ground faults on a system with grounded neutral may therefore result in fault currents, in the lowest self impedance phase that are higher than the three phase fault currents.

-8.2 will be eliminated

-8.3 Limits of Temperature....

-Table 4. The notes will be revised to stress temperature rise above ambient. Note 4) The sentence "this results..." Temperature classes will be eliminated.

-11.6.1. - delete "The most important... duration."

-11.6.2 - This section will be reworded to ensure short circuit testing configuration is not unrealistic re installation configuration.

Comments from Lars-Erik Juhlin (ABB Power Systems) were reviewed.

-The scope will be specifically modified to exclude line trap standard and PLC filter reactors. This will address comments in this area. i.e. 1.2 (10) Line Traps and PLC Filter Reactors (AUSIC99.3)

-A question was raised re acceptable tolerance on losses, especially at harmonic frequency for filter reactors. The appendix will be addressed in the Annex B which covers filter reactors and not in 7.1.1.2. A tolerance as a factor will be proposed as a quality check.

-11.3.5.6 - " All impulses applied to a reactor shall be recorded by a cathode-ray oscillograph or by suitable digital transient recorder."

-11.3.7.1 - This section will be modified to include more definitive techniques to investigate a suspected problem during impulse testing. For example additional reduced wave oscillograph should be compared to the initial one. A series of additional full waves could be applied and the oscillograph examined for evidence of progressive change.

-To avoid possible misunderstandings the words 'manufacturer" and "purchaser" will be used to describe the two contractual parties. The use of "end user" will be eliminated as in some cases the "end user" is not the "purchaser".

-C1.1 The formula should be corrected to:

$$I1 = MVAR / (1.732\ Vs)$$

-Temperature rise limits for reactors used in conjunction with shunt capacitor banks should be assessed because of the nature of their duty. On the limits in C37.21 - 1990 more applicable this will be addressed in Annex C.

- The surge current seen by shunt capacitor reactors during switching should be addressed in ANNEX C. The ANSI breaker standard C37.06 will be consulted. Surge voltages during switching will also be addressed in ANNEX C.

-ANNEX B on filter reactors will be expanded to include information on rated frequency, rated inductance and Q value at rated frequency, steady state voltage drop (stress) eddy losses in ancillary components and sound level. Duty and temperature rise limits for filter reactors will be assessed and included in ANNEX C

-At the beginning of ANNEXES B, C, and D a listing of sections of the standard relevant to the reactor type will be included. This will clarify the use of C57.16 with respect to filter, reactors, shunt capacitor reactors and discharge current limiting reactors.

-An RIV test will be added as "OTHER" to Table 3 for series reactors rated 230 kV and above. The text of the standard will be modified accordingly.

Lars-Erik Juhlin promised to provide input to the Chair for modifications to ANNEXES B, C, and D. The Chair will produce a Draft #9 based on all discussions and input and will re-ballot members of the Dry-Type Reactor Working Group, Dry-Type Smoothing Reactor TF and Dry-Type Transformers Subcommittee well in advance of the Kansas City meeting - January '95 target date.

The meeting adjourned at 5:45 P.M.

Note: Paulette Payne submitted 2 pages of editorial comment on Draft #8 and these will be included in Draft #9.

7.2.2.5 Working Group on Dry Type Test Code C57.12.91

Chair: Mr. David Barnard
Temporary Secretary: Max Cambre

Ref: C57.12.91 - Test Code for Dry Type Transformers

This working group is pursuing the revision/reaffirmation of the Dry Type Test Code - C57.12.91.

The meeting was called to order at 8:00 AM Monday in the Imperial Ballroom at the Pfister Hotel in Milwaukee, WI. Seventeen (17) members; 21 members absent and eleven (11) guests were in attendance.

The minutes from the Dallas meeting were read. A motion was made by Bill Mutschler and seconded by Bill Simpson to accept the minutes as read. The motion passed unanimously.

The first item of business was the resolution of a negative vote by Wes Patterson. He suggested that changes in 8.4 & 9.4 be omitted until the next revision of C57.12.91. The first recirculation (deadline May 1994) has addressed these issues. John Rossetti stated that references to it were inadvertently left in.

The recirculation document was sent out in August resulted in 2 negatives. Rossetti objected to

reference to phase angle error appearing in 9.1 and the 9.2.4 measurement section referring to the omitted section 9.4.1. Barry Ward's negative stated that a 0.3% metering accuracy should be included in C57.12.91.

At this point Oskars Petersons, from NIST, made a statement concerning metering methods. Basically he wants the dry type standard to match the liquid standard. Bill Mutschler addressed the group with the necessity for getting the editorial issues out of the way and not delay the reissue of the standard.

A motion was made by Wes Patterson and seconded by Mike Haas to place a note in the forward that the 0.3% metering accuracy be included in the next revision of C57.12.91. The motion was unanimously carried.

The Chair restated that the negative ballots have been resolved.

Under new business the need to resolve Stan Osborn's negative ballot was brought up. This concerned the issue of power factor. The negative was addressed by adding an Editor's note under table 10.8.4 that the issue of power factor will be reviewed prior to the next revision.

The meeting was adjourned at 9:45 a.m.

7.2.2.6 Working Group on Specialty Transformers - P259

Chair: Mr. R. W. Simpson, Jr.

Ref: IEEE Std 259 - Standard Test Procedures for Evaluation of Systems of Insulation for Specialty Transformers

This WG is charged with the revision of IEEE 259-1979. This standard relates to evaluating the thermal and environmental degradation of small, low voltage, dry type transformers.

The Working Group met 1:20 PM on Monday, September 26, 1994 with 4 members and 6 guests present. 3 of the guests requested membership; bring membership up to 9.

Introductions were made and the minutes of the 3/21/94 meeting were approved as written.

The status of IEEE Std. 259, Draft 8 was reviewed. Draft 8 was not approved at the REVCOM meeting in June, 1994 due to editorial questions. These questions were addressed by Chair Simpson and the standard was approved at the REVCOM meeting in September 1994.

The WG then continued their review of comments received from SCC4.0 on P259/D8 and the comments from REVCOM.

A motion was made to submit a PAR changing the title of the WG, and the standard, from "Standard Test Procedure for Evaluation of Systems of Insulation for Specialty Transformers" to "Standard Test Procedures for Evaluation of Systems of Insulation for Dry-Type Specialty and General Purpose Transformers." After discussion of the proposal, the motion was approved.

There was further discussion on oven-aging of test units versus energizing units to achieve thermal aging. Members of the WG will attempt to provide input on the difference in results, or

lack thereof, using alternate procedures. This will be addressed at our next WG meeting.

A motion was approved to change the difference between aging temperatures from "15 - 35°C" to read "15°C or more."

Chair Simpson will prepare a new draft of IEEE Std 259 to reflect the modifications proposed to date.

Chair Simpson presented a liaison report on IEC Technical Committee 98. A preparatory meeting of TC 98 was held July 12, 1994 to approve the initial scope regarding the standardization of electrical insulation systems testing. A follow up meeting of the US Technical Advisory Group was held on September 12, 1994; the primary focus of the meeting was to propose a standard test procedure for systems evaluation based on established test procedures including IEEE 259. Chair Simpson urged members interested in expressing their opinions on policies and procedures to join the US Technical Committee.

The meeting was adjourned at 2:30 p.m.

7.2.2.7 Working Group on Hot Spot Differentials

Chairperson: Ms. Paulette Payne

This WG was formed to investigate hot spot differential criteria in dry type transformers standards and develop modifications to existing standards if needed.

The WG for Dry Type Hot Spot Differentials met September 27, 1994 in the Henry VIII room of the Pfister Hotel in Milwaukee, WI. The meeting was called to order at 8:00 a.m. There were fifteen (15) members and eighteen (16) guests present; five guests requested membership: Tim Lewis, Ned Brush, Jerry Frank, Subhas Sarkar and Richard Provost.

Following introductions, the minutes of the March 21, 1994 meeting in Dallas, Texas were approved and the Agenda revised to include an additional presentation of data and remarks on previous data presented.

The following are the highlights and "hot spots" of the meeting:

> Tim Holdway presented preliminary data on a sheet wound design. The hot spot ratio in the primary hot spot was found to be 1.26 - 1.32, and in the secondary 1.4 - 1.45. Delep Purohit also presented data of hot spot temperature rise measurements for cast coil, open wound disk and open wound barrel windings. Readings were taken from thermocouples mounted in the ducts, and moved circumferentially around the coil. The tested units had an inner and outer layer, vertical ducts and a 30-40 mil cover thickness. Results indicate hot spot ratios lower than Lin's data. Lin Pierce presented data on a 2500 kVA disc winding transformer which indicated a hot spot ratio of 1.4 for the coil and a slightly higher ratio for three coils. The effect of harmonics was discussed. Lin Pierce stated that the effect of harmonics on the hot spot ratio was included in the modeling, but not the testing. Phil Hopkinson indicated that harmonics would have to result in a significant increase in loss density to affect loading.

The results of the ballot for revision of C57.12.01 - 1989 Table 4A. were as follows:

19 ballots sent, 15 returned (79%; 2 abstain, 2 approved, 2 approved with comments and 9 negative.

The comments on the ballots were discussed. Several noteworthy points were made:

(1) There is a wide variation in construction which does not render to identification of fixed hot spot ratios.

(2) Insulation life is based upon 40,000 hours (4.7 years). With an average annual temperature of 20°C, a 40°C maximum temperature and a 30°C 24 hour average temperature, this equates to a 20 year life at a hot spot of 210°C.

(3) Focus should be on the methodology for determination of hot spot temperatures.

The Working Group affirmed a proposal for re-balloting Table 4A as follows:

- There will be one column indicated for average winding temperature rise.

- There will be a constant hot spot ratio of 1.2.

- Paragraph 5.11.13.1 will be revised to read "hottest spot temperature rises as determined from the manufacturer's design test data shall not exceed the limits given in Table 4A. The average winding temperature rise above the ambient temperature, when measured by the resistance method and tested in accordance with the applicable provisions of ANSI/IEEE C57.12.91 shall not exceed the values given in Table 4A. Average winding temperature rise shall be determined by test. Hottest spot temperature rise shall be determined by calculation from empirical equations developed from design family test data. In the absence of design data a ratio of 1.5 shall be used between Hot spot temperature rise and average temperature rise."

There being no other business, the meeting was adjourned at 9:18 a.m.

7.2.2.8 Working Group on Dry Type General Requirements

Chair: Mr. Anthony J. Jonnatti

This working group is preparing revisions for General Requirements for Dry Type Distribution, Power, and Regulating Transformers Standard C57.12.01.

This working group met on September 27, 1994 at 10:55 a.m. in the Kennedy/Roosevelt room of the Pfister hotel in Milwaukee, Wisconsin. The group contained 15 members and 6 guests. 3 guests requested to become members of the Working Group.

After the introductions, the minutes of the Dallas meeting were approved.

Bill Mutschler wants to propose a #6 proposal: "Accuracy of measurements for test data." Bill will send to Tony._There was no disagreement, so we will add a #6 proposal.

The first item of discussion was the negative ballots for proposal #1. There were 3 negative ballots. Bill Mutschler stated we should state that the 3 sound charts should be for 150°C rise.

After a lengthy discussion, Wes Patterson made a motion to leave the table as is with exception to saying the voltage is the H.V. of the transformer. It was seconded. However, Gene Morehart from Acme still votes negative.

Again after a lengthy discussion, it was decided to change Table 3C to say 601 volts - 1.2 kV. After all agreed, the chair said he would re-submit to the members.

The next item of discussion was the nameplate information. One negative ballot from Roy Bancroft was resolved. Bill Mutschler proposed we eliminate the full proposal. Jeewan Puri seconded and it was unanimous.

The next item was the proposal for the partial discharge. The two negative ballots were settled and the Chair will resubmit to the members.

Since time had run out, the chair stated he would send back out the ballot with the changes discussed earlier.

With the work completed on the items recommended, the meeting adjourned at 12:10 p.m.

7.2.3 Additional Discussion

Following this Subcommittee report, there was some discussion regarding full Committee ballots. The following points were noted:

- Entire documents must be balloted for approval. Revised parts may be highlighted for detailed evaluation, but the entire document is subject to comment.
- No revisions are allowed to a document on a ballot for Reaffirmation. Editorial corrections can be made by issuing an errata sheet. A document can be submitted to the Standards Board for reaffirmation approval with negative ballots.

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE

DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: DRY-TYPE TRANSFORMERS / CHAIRPERSON: W. PATTERSON / PHONE: (919)856-2420 / FAX: (919)856-2418

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION / PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.01	GENERAL REQUIREMENTS FOR DRY-TYPE DIST. AND POWER TR INCL THOSE WITH SOLID CAST &/or RESIN-ENCAPSULATED WINDINGS							ONE YEAR EXTENSION REQUESTED
NONE	NOT SPECIFIED	JONATTI A.		02/02/89	/ /	1994		APP. BY SB 02/02/89
C57.12.50	REQ. FOR VENTILATED DRY-TYPE DISTRIBUTION TR, 1-500kVA, 1 PHASE, AND 15-500kVA, 3-PHASE HV 601-34500VOLTS,LV 120-600V							COPYRIGHT NOT RELEASED
NONE	NONE ASSIGNED			06/12/89	/ /	1994		BALLOT REAFFIRMATION
C57.12.51	REQ. FOR VENTILATED DRY-TYPE POWER TR, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V, LV 208Y/120 TO 4160 VOLTS							COPYRIGHT NOT RELEASED
NONE	NONE ASSIGNED			06/12/89	/ /	1994		BALLOT REAFFIRMATION
C57.12.52	REQ. FOR SEALED DRY-TYPE POWER TRANSFORMERS, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V,LV 208Y/120 TO 4160 VOLTS							COPYRIGHT NOT RELEASED
NONE	NONE ASSIGNED			06/12/89	/ /	1994		BALLOT REAFFIRMATION
C57.12.55	CONFORMANCE STANDARD FOR TR- DRY-TYPE TRANSFORMERS USED IN UNIT INSTALLATIONS, INCL. UNIT SUBSTATIONS							COPYRIGHT NOT RELEASED
NONE				04/07/86	/ /	1992		BALLOT REAFFIRMATION
C57.12.56	TEST PROCEDURE FOR THERMAL EVALUATION OF INSULATION SYST FOR VENTILATED DRY-TYPE POWER & DISTRIBUTION TRANSFORMERS							TO BE PUBLISHED
PC57.12.56	THERMAL EVALUATION OF DRY-TYPE PROVOST R. L.			08/27/84	/ /	1995	(302)999-2225	ANSI APPROVED 01/04/94
C57.12.58	GUIDE FOR CONDUCTING TRANSIENT VOLTAGE ANALYSIS OF A DRY-TYPE TRANSFORMER COIL			IEC	IAS			PUBLISHED 1992
P745	DRY TYPE DIELECTRIC PROBLEMS	KLINE A. D.		06/27/91	06/28/78	1996	(404)762-1642	ANSI APPROVED 10/11/91
C57.12.59	GUIDE FOR DRY-TYPE TRANSFORMER THROUGH-FAULT CURRENT DURATION							BALLOTING REAF. CLOSES 04/16
NONE	DRY-TYPE THRU FAULT DUR GUIDE	NONE		01/01/89	09/13/84	1994		ANSI APPROVED 08/09/91
C57.12.60	TEST PROCEDURES FOR THERMAL EVALUATION OF INSULATION SYSTEMS FOR SOLID-CAST & RESIN ENCAP POWER & DIST TRANSFORMER			IAS	NEMA	IEC		APPROVED BY SB 10/25/92
PC57.12.60	THERMAL EVALUATION OF DRY-TYPE PROVOST R. L.			10/25/92	08/17/89	1994	(302)999-2225	BEING BALLOTTED IN C57

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: DRY-TYPE TRANSFORMERS / CHAIRPERSON: W. PATTERSON / PHONE: (919)856-2420 / FAX: (919)856-2418

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION / PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.91	TEST CODE FOR DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS			SPD	EM			SECTIONS 8+9 RECIRCULATED
PC57.12.91	TEST CODE FOR DRY TYPE TR	BARNARD D.		11/29/78	06/01/89	1984	(919)738-4251	HARMONIZING WITH C57.12.90-93
C57.16	REQUIREMENTS FOR CURRENT LIMITING REACTORS			NEMA	IAS	T&D		PREPARING DRAFT 6
PC57.16	DRY TYPE REACTORS	DUDLEY R.		09/19/58	03/21/91	1976	(416)298-8108	INCLUDES ONLY DRY TYPE REACTOR
C57.21	REQUIREMENTS TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA							COMPLETE
PC57.21	DRY TYPE REACTORS	DUDLEY R.		04/02/91	/ /	1995	(416)298-8108	ANSI APPROVED 08/09/91
C57.94	RECOMMENDED PRACTICE FOR INSTALLATION, APPLICATION, OPERATION & MAINTENANCE OF DRY-TYPE GEN PURPOSE DIST & POWER TR							PUB. 1982, REAFFIRMED 1987
NONE	APPLICATION OF DRY-TYPE TR			12/09/87	/ /	1987		BALLOTTING REAFFIRMATION
C57.96	GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS			SCC14				MUST REAF. OR REV. BY DEC 94
NONE	GUIDE FOR LOADING DRY-TYPE TR	PIERCE L.		04/26/89	04/26/89	1994	(706)291-3166	
C57.96	GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS			T&D	SCC14	SCC10		BALLOTING REAF. CLOSES 04/18
PC57.96	CAST COIL LOADING GUIDE	PIERCE L.		04/26/89	05/06/91	1994	(706)291-3166	NOT COMPLETED BY 10/93
C57.124	RECOMMENDED PRACTICE FOR THE DETECTION OF PD AND THE MEASUREMENT OF APPARENT CHARGE IN DRY-TYPE TRANSFORMERS			NONE				PUBLISHED 1992
PC57.124	DRY TYPE DIELECTRIC PROBLEMS	KLINE A. D.		06/29/91	06/27/91	1996	(404)762-1642	ANSI APPROVED 10/11/91
IEEE 259	TEST PROCEDURE FOR EVALUATION OF SYSTEMS OF INSULATION FOR SPECIALTY TRANSFORMERS							TO SUBMIT TO REVCOM
P259	SPECIALTY TRANSFORMERS	SIMPSON R. W. JR.		06/22/72	09/26/91	1979	(603)284-4362	TRYING TO ADAPT TO IEC

COORDINATION ACTIVITY OF DRY TYPE SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE / PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD.PHONE
P1303	GUIDE FOR STATIC VAR COMPENSATOR FIELD TESTS				APPROVED BY SB 06/94
09/17/92	SUBS	PHILIP R. NANNERY	914-577-2591	R. F. DUDLEY	416-298-8108

7.3 HVDC Converter Transformers & Reactors - W. N. Kennedy

Meeting Minutes - Milwaukee, WI - September 27, 1994

The meeting was opened at 3:30 p.m. with nine members and six guests present.

The majority of the meeting was spent discussing the transformer ballot of PC57.129/D8 "Trial-Use General Requirements and Test Code for Oil-Immersed HVDC Converter Transformers". Of the 141 ballots mailed out there were 109 votes returned; for a 77% return (75% are required for a valid ballot). There were 84 affirmative, three negative, and 22 abstention votes.

Two of the three negative ballots involved basically additional changes and were resolved at the meeting. The last negative ballot pertained to the determination of harmonic stray and eddy losses, and requested additional details on the measurement techniques, clarification of details, and greater attention to the symbology, terminology, and definitions. Several of the affirmative votes also commented on the symbols used for the harmonic losses. We agree to rewrite this section to include the measurement techniques instead of referencing two IEEE papers, and to change the terminology to agree as much as possible with IEC and IEEE documents currently under preparation.

It was noted that another test method is being investigated by the CIGRE HVDC working group which involves measuring losses at two frequencies such as 50 and 250 Hz., and interpolating losses at other frequencies. Although preliminary measurements agree well with more complicated techniques, we decided to concentrate on the harmonic measuring technique for the present standard. The CIGRE technique could be added to a later revision as an alternative method when additional investigations are complete.

We also agreed to add a note in section 6.11.2 describing the insulation levels for the DC-side windings that on transformers being retested, care needs to be taken on selecting the test levels for lightning and switching impulse tests to insure that they retain margin over the protective level of the lightning arrester.

These changes, together with the editorial ones, will be included in D9 and it is planned to put those sections out for a recirculation of ballot for completion prior to the next meeting.

Also discussed was the smoothing reactor standard work performed in Richard Dudley's task force. It is expected that a new draft of that standard will be prepared prior to the next meeting including the changes discussed at the Dallas and Milwaukee meetings.

Respectfully Submitted,
William Kennedy, Subcommittee Chair

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE

DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: HVDC CONVERTER TR & REACTOR / CHAIRPERSON: W. N. KENNEDY / PHONE: (317)286-9387 / FAX: (317)286-9549

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION: PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.129	GENERAL REQUIREMENTS & TEST CODE FOR OIL-IMMERSED HVDC CONVERTER TRANSFORMERS AND SMOOTHING REACTORS FOR DC POWER TRANSM	EM	T&D	PSIM	SUB			BALLOTING D9 IN TC
PC57.129	SUBCOMMITTEE	KENNEDY W. N.		/ /	09/26/91	0	(317)286-9387	RESOLVING 3 NEGATIVES
IEEE1277	GENERAL REQUIREMENTS & TEST CODE FOR OIL-IMMERSED AND DRY-TYPE HVDC SMOOTHING REACTORS	SUB						NEW DRAFT BEING PREPARED
P1277	SUBCOMMITTEE			/ /	09/25/91	0		PAR APPROVED 09/26/91

COORDINATION ACTIVITY OF HVDC CONV. TR & SMOOTHING REAC SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE	PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD.PHONE
P1030.3	GUIDE FOR SPECIFICATION OF HVDC PERFORMANCE - PART III, DYNAMIC PERFORMANCE					DISCUSSING DRAFT IN WG
12/05/91		T&D	LEWIS VAUGHAN	514-652-8457	WILLIAM N. KENNEDY	317-286-9387

7.4 Instrument Transformers - J. E. Smith

September 26, 1994, Milwaukee, WI.

7.4.1 Chair's remarks and announcements

The Instrument Transformer Subcommittee met at 1:30 p.m. with nine members and four guests present. The minutes of the March 22, 1994 meeting at the Grand Kempinski Hotel, Dallas, Texas were approved as written.

The Spring meeting will be held April 23 - 27, 1995 in Kansas City, MO. Future meetings will be in Boston, MA, November 5 - 9, 1995 and April 13 - 17, 1996 in San Francisco, CA.

The next order of business was the reports from the three working groups.

7.4.2 Test requirements for instrument transformers for nominal voltage 115 kVA and above - J. Ma

WG on test requirements for instrument transformers for nominal voltage 115 kVA and above met at 8:00 a.m. on September 27, 1994. Twenty-two members and guests attended. Chair J. Ma.

7.4.2.1 Capacitance & Tan S Test Contributor: Pierre Riffon

Increase of Capacitance and Tan S After Dielectric Tests

(i) Capacitance Increase: The measured capacitance should not increase by more than the equivalent of one capacitor element.

(ii) Tan S Increase: The measured Tan S should not increase by more than 0.001. This criterion will be confirmed in the next meeting.

Temperature Rise at Rated Voltage With Rated Thermal Burden:

If the dielectric loss at room ambient temperature range (20-10 degree C) or (20+10 degree C) accounts for 20% of the total losses of the unit a Type Temperature Rise Test of the equipment at rated voltage with rated thermal burden is appropriate.

7.4.2.2 Ratings and Insulation Levels - Contributor: Vadim Raff

(i) SILs: The SILs proposed appear to be lower than those given in other equipment standards. Vadim will review SIL and confirm in the next meeting.

(ii) Proposed Table 2 and 3 are to be combined with the removal of the 2 u sec. chopped impulse wave figures.

(iii) Table 3 was unnecessary since we have included partial discharge test with the power frequency voltage withstand test. (Report 1). The extinction voltage values are to be included in the Table 2.

7.4.2.3 Endurance Test - Contributor: Pierre Riffon

(i) This is to be a special test.

(ii) The failure mechanism is not completely known. The tests devised by EDF or ENEL appear to be successful in confirming design if equipment meets the test requirements.

(iii) Test procedure requirements will be further discussed in the meeting.

7.4.2.4 Definitions and Testing of Explosion-Proof and Resistant Instrument Transformers - Contributor: Ross McTaggart

(i) Externally initiated failure is precluded from the definition.

(ii) At the present state of art, explosion-proof oil-filled equipment is not possible as oil is not compressible.

(iii) WG will proceed as far as to:

A) Identify the new concept.
B) Requirements and,
C) Devise a possible test procedure.

(iv) Ross McTaggart is to fine tune the definition for the next meeting.

7.4.2.5 Mineral Oil Test Requirements Contributor: Wayne Hansen

(i) The proposed water content appears to be too high.

(ii) Wayne Hansen is to discuss this topic in the next meeting.

7.4.3 WG on the revision of C57.13 - Tom Nelson

WG on the revision of C57.13 met at 10:55 a.m. on September 27, 1994. Eleven members were in attendance. Chair, Tom Nelson.

Suggestions for candidate sections for revision were asked for. No section was singled out as in the most need of revision.

Questions concerning specific terms were brought up and are:

Why is burden accuracy not defined? Should it be defined? Should there be a subscript r or m placed on a burden to indicate a relaying or meter burden? Should there be a note for table 2 to reference section 8.8?

These items will be discussed at the next meeting.

Meeting was adjourned at 12:00 p.m.

7.4.4 WG on use of instrument transformers with electronic meters and relays - Chris Ten Haagen

WG on use of instrument transformers with electronic meters and relays met at 2:00 p.m. on September 27, 1994, members and guests attended. Chair, Chris Ten Haagen.

The first meeting of this working group was opened at 2:00 p.m., September 27, 1994.

7.4.4.1 New Business

Preliminary orientation was provided by the chairperson. To summarize:

> Electronic meters impose significantly lower burdens on Voltage and Current Instrument Transformers than classic induction watt-hour meters. In addition, one electronic meter may perform functions that require several induction type meters and/or recorders. finally, electronic meters have both higher accuracy and dynamic range than traditional watt-hour meters.

In addition to addressing meter and relay burdens, related issues to consider may include system power factor, harmonics, test points, frequency, accuracy levels, and harmonization with IEC.

For the next several meetings, the goal of this working group should be to:

1) agree on the need for new standards in this area.
2) define scope and completion of this working group.
3) define action items and timetable to achieve said completion.

Several members agreed to research and report on related background data for the next meeting:

~ Jim Harlow will provide some information regarding burden requirements of electronic relays.
~ Tom Nelson will research C12.16- electronic meter accuracy standards.
~ Jim Smith will review applicable IEC standards re burdens, accuracy, etc. as they apply to this working group topic.
~ Chris Ten Haagen will provide some observed electronic meter burden data values.

Others are encouraged to review C57.13-1993 as it relates to this topic. Comments from users are especially helpful.

The meeting was closed at 2:45 p.m.

W. E. Morehart, Secretary
1/11/95

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: INSTRUMENT TRANSFORMERS / CHAIRPERSON: J. E. SMITH / PHONE: (919)827-2121 / FAX: (919)827-2121

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION: PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.13	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS			PSIM	PSR	SPD		WAITING ANSI APPROVAL
P546	SUBCOMMITTEE			03/30/78	06/14/94	1992		REV. PAR APPROVED 06/14/94
C57.13.1	GUIDE FOR FIELD TESTING OF RELAYING CURRENT TRANSFORMERS							APPROVED BY ANSI 12/02/92
PSRC	SUBCOMMITTEE			08/25/87	/ /	1992		RELAY COMM. DOCUMENT
C57.13.2	CONFORMANCE TEST PROCEDURES FOR INSTRUMENT TRANSFORMERS							PUBLISHED 1992
NONE	SUBCOMMITTEE			04/16/86	09/26/91	1996		RECOGNIZED BY ANSI 12/23/92
C57.13.3	GUIDE FOR THE GROUNDING OF INSTRUMENT TR SECONDARY CICUITS AND CASES							TRANSFER FROM PSRC COMMITTEE
NONE	SUBCOMMITTEE			01/23/87	/ /	1991		
C57.13.4	DETECTION OF PARTIAL DISCHARGE AND MEASUREMENT OF APPARENT CHARGE WITHIN INSTRUMENT TRANSFORMERS			T&D				NO PROGRESS LATELY
P832		JONNATTI A. J.		/ /	05/28/80	0	(813)785-2788	
C57.13.5	GUIDE FOR PARTIAL DISCHARGE MEASUREMENT IN INSTRUMENT TRANSFORMERS 69 kV AND ABOVE			SWGR	EM			CHANGES NEEDED IN PAR
PC57.13.5	SUBCOMMITTEE	MA J.		/ /	06/14/94	0	(706)554-8800	SUBMIT NEW PAR WITH CHANGES
C57.13.6	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS FOR USE WITH ELECTRONIC REVENUE METERS AND RELAYS			PSIM	PSR	TD	PSC	PAR DISSAPROVED
PC57.13.6	SUBCOMMITTEE	TEN-HAAGEN C. W.		/ /	/ /	0	(603)749-8433	MAKE CHANGES AND RESUBMIT PAR

COORDINATION ACTIVITY OF INSTRUMENT TRANSFORMERS SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE	PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD.PHONE
P1304	CURRENT MEASURING SYSTEMS WHICH USE OPTICAL TECHNIQUES					
06/18/92		PSIM	T. R. McCOMB	613-990-5826	J. N. DAVIS	404-393-9831
PC37.110	GUIDE FOR THE APPLICATION OF CURRENT TRANSFORMERS USED FOR PROTECTIVE RELAYING PURPOSES					
05/31/90		PSR	GRAHAM CLOUGH	206-737-6912	JOHN N. DAVIS	404-393-9831
PC37.97	GUIDE FOR PROTECTIVE RELAY APPLICATION TO POWER SYSTEM BUSES					ANSI APPROVED 05/20/91
12/10/87		PSR	STEVE CONRAD	505-848-2642	JOHN N. DAVIS	404-393-9831
PC57.13.1	GUIDE FOR FIELD TESTING OF RELAYING CURRENT TRANSFORMERS					REAFFIRMED 1992
12/31/80		PSR	ARUN G. PHADKE	703-231-7029	JOHN N. DAVIS	404-393-9831

7.5 Insulating Fluids - F. J. Gryszkiewicz

The Insulating Fluids Subcommittee met in Milwaukee, Wisconsin on Monday, September 26 and Tuesday, September 27, 1994 with 26 members and 18 guests in attendance. Of the 18 guests in attendance, 5 requested membership on the Subcommittee.

The Minutes of the meeting held in Dallas, Texas (March 21 and 22, 1994) were approved as submitted.

7.5.1 Current Subcommittee Projects:

7.5.1.1 C57.130 - Trial Use Guide for the Use of Dissolved Gas Analysis During Factory Thermal Tests for the Evaluation of Oil Immersed Transformers and Reactors

The Working Group met jointly with the Insulating Fluids Subcommittee on Monday, September 26. Since the last meeting in Dallas Draft 8 of the Guide was balloted at the Subcommittee level, with the following results:

30 - Affirmative
16 - Affirmative with Comments
10 - Negative

Negative ballots of those in attendance at the meeting were resolved. One negative ballot was not resolved due to the balloter not being present at the meeting. The Working Group Chair will contact the individual and resolve the negative ballot.

Comments received at the meeting will be incorporated into Draft 9 which will be sent out for Subcommittee ballot prior to our next meeting in Kansas City.

7.5.1.2 P1258 - Guide for the Interpretation of Gases Generated in Silicone-Immersed Transformers

The Working Group met jointly with the Insulating Fluids Subcommittee on Tuesday, September 27. Since the last meeting in Dallas, Draft 5 of the Guide was balloted at the Subcommittee level, with the following results:

15 - Affirmative
14 - Affirmative with Comments
10 - Negative

All negative ballots were resolved. Comments received at the meeting will be incorporated into Draft 6 which will be sent out for Subcommittee ballot prior to our next meeting in Kansas City.

A major problem encountered by the Working Group has been that it has very little (or no) data for silicone transformers which have failed in service. Thus, it has been difficult to decide on "limits" (or what we now refer to as threshold values) for the Guide. In addition, some of the material dealing with the Interpretation and Evaluation of the DGA results is based on small scale laboratory modeling results.

In view of the foregoing, the Subcommittee voted to change this guide to a Trial Use Guide. The Subcommittee Chair will submit the appropriate paper work to IEEE Headquarters for the title change.

7.5.2 Other Business

7.5.2.1 Water-in-Oil and Water-in-Paper Insulation

The Subcommittee currently has a Task Force looking into water-in-oil and water-in-paper insulation. This Task Force, which is Chaired by Frank Heinrichs, met on Monday morning, September 26.

There is much reference material available on this subject; however, all work done assumes equilibrium between the water-in-oil and water-in-paper. This is not the case, equilibrium is never reached.

After much discussion, it was decided that the Task Force will attempt to obtain water-in-oil (including sampling temperatures) data on transformers which have failed. The Task Force is also considering presenting a Symposium on this subject at the Fall 1995 meetings in Boston.

7.5.2.2 ASTM Method D 2298-81 Standard Test Method for Stability of Insulating Oils Under Electrical Stress (Merrell Test)

Mr. Tom Rouse, Chair of ASTM Committee D-27 on Electrical Insulating Liquids and Gases, has been in contact with the Insulating Fluids Subcommittee Chair on this subject. Although ASTM Method D 2298 was discontinued, Committee D-27 has received a proposal to develop a modified Method D 2298. A copy of this modified method will be sent to all Insulating Fluids Subcommittee Members with the minutes of the meeting held in Milwaukee.

Subcommittee members are urged to review the modified method and be prepared to discuss any comments at our next meeting in Kansas City. If you do not plan on attending the next meeting, please send your comments to the Chair by February 1, 1995.

Frank J. Gryszkiewicz, Chair
Gene Kallaur, Secretary

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: INSULATING FLUIDS / CHAIRPERSON: F. GRYSZKIEWICZ / PHONE: (617)926-4900 / FAX: (617)926-0528

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION	PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.104	GUIDE FOR THE DETECTION AND DETERMINATION OF GENERATED GAS IN OIL-IMMERSED TRANSFORMERS & THEIR RELATION TO SERVICEABIL.			PSR T&D					NO WORK IN PROGRESS
PC57.104		HEINRICHS F. W.			06/07/92	05/31/90	1996	(412)941-6924	PUBLISHED 1992
C57.106	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF INSULATING OIL IN EQUIPMENT			NONE					PUBLISHED 1992
PC57.106	SUBCOMMITTEE				11/20/91	06/19/86	1995		ANSI APPROVED 11/20/91
C57.111	GUIDE FOR ACCEPTANCE OF SILICONE INSULATING FLUID AND ITS MAINTENANCE IN TRANSFORMERS			IAS T&D ED&PG IEC					SUBMIT REAFIRMATION TO SB
NONE	SUBCOMMITTEE				02/02/89	12/10/87	1994		
C57.121	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF LESS FLAMMABLE HYDROCARBON FLUID IN TRANSFORMERS			PSRC T&D IAS IEC					SUBMIT REAFFIRMATION TO SB
P954	SUBCOMMITTEE				02/22/88	04/12/82	1994		
C57.130	GUIDE FOR USE OF DISSOLVED GAZ ANALYSIS DURING FACTORY THERMAL TESTSFOR THE EVALUATION OF OIL-IMMERSED TRANS. AND REACT.			NONE					D8 BEING REVIEWED (TRIAL-USE)
PC57.130	GAS ANALYSIS DURING FACT.TESTS KINNEY J. P.	F. W. HEINRICHS			/ /	03/17/93	0	(706)291-3163	CHANGE IN TITLE AND SCOPE
IEEE 637	GUIDE FOR THE RECLAMATION OF INSULATING OIL AND CRITERIA FOR ITS USE								REAFFIRMED 03/18/92
P637	SUBCOMMITTEE				06/04/84	/ /	1997		
IEEE 799	GUIDE FOR HANDLING AND DISPOSING OF ASKARELS			EIS IAC T&D					REAFFIRMED 03/18/92
P799	SUBCOMMITTEE				11/17/86	09/27/79	1997		
IEEE1258	GUIDE FOR INTERPRETATION OF GASES GENERATED IN SILICONE-IMMERSED TRANSFORMERS			T&D SCC14					PAR APPROVED BY SB 12/05/91
P1258	GUIDE FOR GAS ANALYSIS-SILICON GOUDIE JIM				/ /	12/05/91	0	(517)496-6826	PREPARING D07

COORDINATION ACTIVITY OF INSULATING FLUIDS SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE	PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD. PHONE
P 980	GUIDE FOR THE CONTAINMENT AND CONTROL OF OIL-SPILLS IN SUBSTATIONS					GUIDE EXTENDED TO 12/94
09/17/92		SUBS	RICHARD G. COTTRELL	517-788-0817	F. GRYSZKIEWICZ	617-926-4900

7.6 Insulation Life - L. W. Pierce

The Insulation Life Subcommittee met on Tuesday Sept. 27, 1995 in Milwaukee, Wisconsin with 28 members and 17 guests in attendance. The minutes of the March 22, 1994 meeting in Dallas, Texas were approved as written. New subcommittee members are Javier Artega, Monroe Frazier, David Goodwin, and Dennis Orten. David E. Truax resigned.

The reports of the Working Groups and Task Forces were then given.

7.6.1 Task Force on Hottest Spot Temperature Rise Determinations - Don Platts, Chair

The Task Force met on Monday Sept. 26, 1994 at 8:00 AM with 18 members and 18 guests present. 4 new members were added. The minutes of the Dallas meeting in March 1994 were approved.

The Chair reviewed the objective of the Task Force, to provide a recommendation to the Working Group on Thermal Tests for a preferred method, or methods to assure that a transformer's hottest spot does not exceed the 80 °C requirement in C57.12.00.

Three members presented reports on methods of demonstrating compliance.

Ed Norton recited the history of using fiberoptics to measure the hot spot temperature. He presented recent test data that showed the differences in the calculated hot spot temperature, using the heat run data as a basis, and a graph of the temperatures recorded with the fiberoptic sensors. In this case, the calculated temperature exceeded the measured values.

Ed reviewed the benefits of using the direct reading sensors. He proposed, based on today's costs, that it is practicable to install for transformers rated 12 MVA and above. He concluded with a proposal for consideration to require installation of the sensors in transformers rated above 12 MVA.

Bill McNutt raised questions to show that the correct location for the sensors still had to be determined by calculation.

Harold Moore elaborated on the paper written by Bill McNutt before the March meeting. His intent was to define the major elements of calculating the conductor temperature rises. He included some of the items that might be omitted in a simplified calculation method, but which are required for any accurate conductor temperature calculations. Bill McNutt pointed out that while this report does not establish detailed calculation procedures, it defines the elements necessary in the thermal model at a level appropriate for inclusion in a standard.

Bob Grubb provided an example of the thermal evaluation method used by several manufacturers of small power transformers. The steps are:

1. The product line can be grouped into design families based on loss characteristics and physical size.
2. The highest loss unit in the group can be built equipped with thermocouples, and tested to verify the temperature rise and hot spot temperature.
3. All other units in that family will have lower temperature rises, and hot spots, so therefore, they will all meet the requirements of the standards, even though they were not specifically tested.

Other manufacturers indicated that they have used a similar approach, and also used the data to fine tune their temperature calculations.

Harold Moore reported that manufacturers of large power transformers have offered temperature data during design review meetings from a wide variety of sources. Some have very detailed computer analysis of the thermal design, and others have stated that they calculate the hot spot as 15°C above the average winding rise.

There were several lengthy discussions on the need for accurate hot spot temperature data for the users who want to use the temperatures for dynamic loading of their units. Although that is not the intended purpose of the Task Force, the topic is important enough to users that it will be discussed repeatedly. It is expected that the result of the Task Force work will include information necessary to help users assure that the accuracy of the hot spot temperature information provided will be adequate for all of their needs.

The Task Force discussed the proper forum for the information gathered and discussed. They will also seek clarification of the type of document to be produced by the Task Force. Is it to be a short insert to C57.12.00, or a detailed guide for identifying, by measurement, or calculation, the hot spot temperature? Although that has not been resolved, Don Platts will produce a first draft (outline) of a paper to collect the information presented to date. There are several persons who have agreed to review and add to that effort.

7.6.2 Working Group on Thermal Tests - R. L. Grubb, Chair; D. L. Fallon, Secretary

The second report was given by Bob Grubb, Chair of the Working Group on Thermal Tests. They met at 8:00 AM on Tuesday, Sept. 27, 1994 with 20 members, and 38 guests in attendance. Monroe Frazier, Pierre Feghali, and V. S. N. Sankar were added to the Working Group. After the normal introductions, the minutes of the 3/21/1994 meeting were approved as mailed.

Discussion on the agenda's first project report P838/ANSI PC57.119, "Recommended Procedures for Performing Temperature Rise Tests on Oil Immersed Power Transformers at Loads Beyond Nameplate Rating", took the entire time slot for the meeting. In preparation of Draft 13 the Chair became aware of a difficulty that needed to be addressed with the Working Group. In the preparation of the previous draft, the 100 % test was changed so that oil rises were obtained with a loading equivalent to produce total losses, and then there was a cutback to 100 % rated current for winding resistance measurement. This made the 100 % test equivalent to a standard temperature rise test. The reduced load (70 %) and overload (125 %) tests were not changed, as it was not felt necessary. It became evident while analyzing the data from tests performed using the procedure that the winding gradients from the reduced load and overload tests could not be added directly to the measured oil rises, as these oil rises were obtained using rated current, not current to approximate total losses. This problem could be taken care of by discussion of the necessary extrapolations in the data evaluation section, but it was felt that there still might be some confusion during the testing procedure. In order to address this issue, it was proposed that all three tests be run as the 100 % test, with current to approximate total losses, and then a cutback to the rated current for the particular test. This would add approximately two hours to the total test procedure. By a show of hands, the Working Group concurred with this proposal, and the change will be made for draft 13.

Linden Pierce had submitted a letter dated 9/26/1994 to the Chair, suggesting several additional changes for the next draft. The letter was distributed at the meeting, and these points were discussed. The consensus of the Working Group was to accept two proposed changes deleting sentences in Sections 8.6.21 and 8.6.2 that referred to relative inaccuracies of alternate methods of determining oil time constants. Mr. Pierce felt there was no justifiable rationale for including these statements, and the group concurred. A third item suggested the replacement of equation 2 (from the definition of thermal time constant of oil in clause 7.0) with equation 10 from the Loading Guide. This will be reviewed further in preparation of the next draft. Working Group members are encouraged to contact the Chair with a few weeks of the meeting if they have concern with this proposed change.

A question was next raised on the use of top oil temperature in Appendix A, Page A7, as this temperature is not accurately representative of the top oil temperatures of the various windings. The inaccuracy of the model is recognized, but a change was not felt appropriate at this stage in trying to get this document issued. A note will be added discussing the assumptions made in the model.

Jin Sim brought up a difference found in test determination of oil time constant depending on whether the heat up or cool down method was used, with the time constants up to 50 % longer using the cool down method. The Loading Guide Calculations are closer to the clause 8.6.2 (heat up) method, so there was some discussion on eliminating the cool down method (clause 8.6.2). In the end it was decided to leave both methods in and to add a discussion of the difference.

Subhash Tuli then reported that winding rise calculations varied only very slightly depending on whether fans were left on or off during resistance measurement, and asked for a clarification on how the document would address this. After discussion, the Working group came to a consensus that conformance to C57.12.90 was appropriate. C57.12.90 is believed to call for pumps on and fans off; that will be confirmed and the document will be brought into conformance.

Bob Whearty raised an issue, based on the two transformer tests using the recommended procedure, that the 70 % test level appeared to be too low, in that it was skewing the value of the exponents such that calculated oil rises for the 125 % run were lower that these values. He is considering publication of these results, and suggested tests at three higher values, for example, 100 %, 115 %, and 125 %. The Chair pointed out the need to have widely spaced data points to increase the accuracy of exponent determination as one of the reasons for including a 70 % test. The procedure will be left as is, to gain more experience. If additional data points to a need to change in this area, it will be considered for the future. Subhash Tuli volunteered to assist in evaluation of such data, and asked that if others run tests at different levels they send copies of data to him.

Draft 13 will be distributed for ballot prior to the next meeting.

Don Platts then brought up an issue from his meeting of the Task Force on Hottest Spot Temperature Rise Determination where guidance from the Working Group was requested. The question was whether the Task Forces effort should be directed towards a brief statement in C57.12.00 on factors involved in a manufacturer's need to demonstrate that hot spot rise does not exceed 80 °C, or whether it should work towards a more detailed discussion, in tutorial or recommended procedures format on location and calculation of hottest spot. Again after considerable discussion, the consensus was that it was necessary to do both. It was suggested that the task force start on a separate document for this procedure.

7.6.3 Task Force on Revision of Temperature Test Code (Section 11 of C57.12.90) - George Henry, Chair

The first meeting of the Task Force met at 1:20 P.M., Sept. 26, 1994 with four members and 16 guests present. John Bosiger, R. H. Hartgrove, Joseph Melanson, Filipe Weffer, and Linden Pierce were added to the Working Group bringing the total membership to nine.

The first order of business discussed was the objective and scope of the Task Force. The Task Force will concentrate on editorial revisions to Section 11. Editorial revision will include correction of typographical errors, revision of symbols, and revision of grammar and sequence of materials in the document for improved clarity. Suggestions for substantive changes to Section 11 will also be considered by the Task Force. Substantive changes will be incorporated into the document when controversy can be avoided. The objective of the Task Force is to prepare an editorially revised document before the next publication of C57.12.90 which will probably occur in 1996.

Linden Pierce reviewed the balloting procedures the Task Force will follow. Changes to Section 11 will be balloted in the Insulation Life Subcommittee. Following successful balloting within the Insulation Life Subcommittee, the document will be submitted to Steve Smith who has responsibility for coordinating all changes to C57.12.90. Assembled revisions to C57.12.90 will be balloted within the Transformers Committee.

Following these discussions, the Task Force reviewed Section 11 in its entirety. The following changes were identified for incorporation into Draft 1, which will be issued prior to the next meeting.

1. All reference to temperature using the symbol T will be changed to Q or DQ with subscripts as appropriate.
2. In Section 11.1.1, reference to IEEE Std. C57.92-1981, equation 9 will be updated to reference the appropriate equation in the new loading guide.
3. Language of Section 11.3.1 will be rewritten for improved clarity.
4. The typographical error in Table 6-Winding Temperature Correction Factor will be corrected.
5. In Section 11.2.1.2, the method implied for extrapolation of resistance to time of shutdown is considered archaic. A more modern approach will be suggested.

In addition to these changes, the Task Force recognized that reordering the sequence of some material would benefit clarity of the document. Linden Pierce agreed to supply the Chair a copy of a draft for the Temperature Rise Section applying to Dry Type Transformers. The Chair will use the Dry Type Test Code Draft as a guide for reordering the sections for the Liquid-Immersed Transformer Test Code.

7.6.4 Task Force on Definition of Thermal Duplicate - Barry Beaster, Chair

The Task Force Meeting on Project PC57.12.00L, Definition of Thermal Duplicate, was opened at 10:55 AM on September 26, 1994 with 10 members and 21 guests. Jin Sim, Aslam Rizvi, Pierre Feghali, and R. L Plaster were added as members. Minutes of the March 21, 1994 meeting were accepted as issued.

A preliminary Draft 3 was issued as a first attempt to resolve the four negative ballots received on Draft 2. The changes in draft 3 were reviewed. The preliminary draft and changes will be incorporated into a formal Draft 3 that would be balloted in the Task Force. The discussion was as follows:

1. Table 16 was changed from four categories to three. Since this table covers such a broad range of transformers, some of the categories may apply more to small units rather than to large units.
2. Wording in paragraph 7.4 needs to be adjusted to state that calculations may be submitted if thermal tests are not required. The preliminary draft did not clearly identify this requirement.
3. Comments regarding the standardization of cooling flow path examples to comply with definitions elsewhere in the standards was requested. It may be resolved to leave these categories as in the preliminary draft if the words "for example" are incorporated.
4. In paragraph 8.5.4 the term "windings" was put in where the term "coils" appeared before.
5. In the sections of paragraph 8.6, the variables were rearranged to match the ordering of table 8 in draft 2.
6. The preliminary draft 3 includes the new variable "external cooling dissipation capacity", and the variable "external cooling dissipation rate" from draft 2 was dropped.
7. The variables "top oil rise" and "average oil rise" were dropped in the preliminary draft 3 due to redundancy with "test losses" and "external cooling dissipation capacity" yielding oil rises that must equate. Discussion in the group was to retain these variables as they are readily available on test reports and there is a comfort level in making comparisons.
8. Comment on the similarity of disk and helical coils when thermal characteristics are the same will be included in Draft 3.
9. Discussion on the revised equations 8.7.1 and 8.7.2 (the average oil rise and top oil rise) with the modification to use the "external cooling dissipation capacity" was resolved to provide both the Draft 2 and preliminary Draft 3 equations to allow the membership to study them in comments to the ballot of the document.
10. The use of exponent 'z" as applied in the alternate method in the Loading guide was questioned and will be addressed after Draft 3 is balloted.
11. A brief review of the ranges of the variables was made as several were modified in the preliminary draft 3. Comments received at the meeting were the draft 2 ranges should be used as they are based on a previous survey. Any future changes should be made if necessary to address resolving negative ballots.

7.6.5 Working Group on High Temperature Insulation for Liquid-Immersed Power Transformers - Michael A. Franchek, Chair; William J. McNutt, Secretary

The Working Group met at 9:30 AM on September 25, 1994 with 21 members and 27 guests present. The minutes of the March 21, 1994 meeting were approved.

The closure of the Background Information Paper which had been presented at the 1994 Winter Power meeting was distributed and discussed briefly.

Following the last meeting, a revision 2 of Draft 2 of the "IEEE Trial Use Guide for the Application of High Temperature Insulation in Liquid-Immersed Power Transformers" had been prepared by the Chair and distributed to the membership. Changes identified from discussions at the March 21st meeting had been introduced. Further discussion revealed the need for further changes which were largely editorial. Specific items were:

1. Add to the bibliography a reference to a paper presented in Brighton, England which described in some detail the dual temperature aging models currently under test by DuPont.
2. Add to the life equation presented on page 12 the values for the A and B constants which would be appropriate for aramid paper insulation.
3. Add an annex to cover gases which could be generated by thermal breakdown of high temperature aramid insulation.
4. Make numerous editorial changes.

The changes will be made to produce Draft 3 of the Trial Use Guide. Since the document is now at a stage of fine-tuning, it was proposed and voted that draft 3 should be simultaneously balloted in the Working Group and the Insulation Life Subcommittee. This action will be taken before the next meeting.

7.6.6 Working Group on Thermal Evaluation of Liquid Immersed Power & Distribution Transformers - Larry Lowdermilk, Chair

This Working Group did not meet. Plans are to complete a draft for ballot of the Transformers Committee before the next meeting.

7.6.7 Task Force on Combined Effects of Thermal and Dielectric Stresses on Insulation Life - Mike Mitelman, Chair

This Task Force formed to collect data will postpone work for 1 to 2 years until other documents in the Insulation Life Subcommittee are completed. The topic will appear as an agenda item of the Insulation Life Subcommittee.

7.6.8 New Business

The Loading Guide for Voltage Regulators, C57.95, must be reaffirmed by 1996. A Working Group Chair is needed.

Respectfully Submitted by:
Linden W. Pierce
Insulation Life Subcommittee Chair

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: INSULATION LIFE / CHAIRPERSON: L. W. PIERCE / PHONE: (706)291-3166 / FAX: (706)291-3167

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION / PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.00	DEFINITION OF THERMAL DUPLICATE			EM IAS				
PC57.12.001	THERMAL TESTS	GRUBB R. L.	BARRY BEASTER	/ /	05/31/90	1997	(414)547-0121	
C57.12.90	STANDARD TEST CODE FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS							WILL START REVISING SECT. 11
NEW	REVISION OF SECTION 11	HENRY G.		/ /	/ /	1998	(501)534-5332	
C57.91	GUIDE FOR LOADING MINERAL OIL-IMMERSED TRANSFORMERS			SUB T&D PSE				REVISION BALLOTED 01/94
PC57.91	GUIDES FOR LOADING	PIERCE L.		03/21/91	06/13/85	1997	(706)291-3166	APPROVED BY ANSI 01/13/92
C57.92	GUIDE FOR LOADING MINERAL OIL-IMMERSED POWER TRANSFORMERS UP TO & INCL 100 MVA WITH 55 C OR 65 C AVE. WINDING RISE			T&D SUB PSE				PUB. 1/12/81, REAFFIRMED 1991
PC57.91	GUIDES FOR LOADING	PIERCE L.		03/21/91	06/28/85	1997	(706)291-3166	TO BE COMBINED INTO C57.91
C57.95	GUIDE FOR LOADING LIQUID-IMMERSED STEP-VOLTAGE AND INDUCTION-VOLTAGE REGULATORS							NO WORK IN PROGRESS
NONE	GUIDES FOR LOADING			03/21/91	/ /	1996	(314)554-3097	BALLOT FOR REAF. REQUESTED
C57.100	TEST PROCEDURE FOR THERMAL EVALUATION OF OIL-IMMERSED DISTRIBUTION TRANSFORMERS			NPE EM T&D SPD				APPROVED BY ANSI 12/02/92
C57.100	THERMAL EVALUATION	LONDERMILK L. A.		03/18/92	10/20/88	1997	(704)462-3113	REAFFIRMED 03/18/92
C57.115	GUIDE FOR LOADING MINERAL-OIL-IMMERSED POWER TRANSFORMERS RATED IN EXCESS OF 100MVA (65 C WINDING RISE)							COMPLETED COMMITTEE BALLOT
P756	GUIDES FOR LOADING	PIERCE L. W.		03/21/91	/ /	1996	(706)291-3166	ANSI APPROVED 01/13/92
C57.119	RECOMMENDED PRACTICE FOR PERFORMING TEMP. RISE TESTS ON OIL-IMMERSED POWER TRANSFORMER AT LOADS BEYOND NP RATING (P838)			SWGR SUBS SCC4 PSRC IAS EI				NEW PAR APPROVED 09/17/92
P838	THERMAL TESTS	GRUBB R. L.		/ /	09/17/92	0	(414)547-0121	REVISED PAR (TITLE & SCOPE)
IEEE1276	TRIAL-USE GENERAL REQUIREMENTS FOR LIQUID-FILLED DISTRIBUTION AND POWER TR UTILIZING HIGH TEMP SOLID INSULATING MATERIAL			T&D				
P1276	HIGH TEMPERATURE INSULATION	FISCHER H.	M. A. FRANCHER	/ /	09/25/91	0	(802)748-8106	STUDYING HI-T MATERIALS

7.7 Performance Characteristics - B. K. Patel

Milwaukee, WI - September 27, 1994

7.7.1 Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met at 9:30 a.m. on Tuesday September 27, 1994 with 59 members and 34 guests present. The members included seven new members who signed up at the meeting.

7.7.2 Approval of Meeting Minutes

The minutes of the March 22, 1994 PCS Meeting in Dallas, TX were approved as written.

7.7.3 Chair's Remarks

7.7.3.1 Administrative Subcommittee Notes

The following items of the discussion at the September 26, 1994 Administrative Subcommittee meeting were highlighted:

1. The next Transformers Committee meeting will be held in Kansas City, MO at the Hyatt Regency/Crown Center Complex on April 23-26, 1995. Greg Anderson of Black & Vietch will host the meeting.

2. PES Publication Guide has been recently modified and is available as part of the Author's Kit from IEEE.

3. WG and TF chairpersons are encouraged to use metric units in the future standards and guides as applicable and practical. A preferred way is to use metric units with the equivalent English units in parentheses or vice versa is acceptable as an alternate.

7.7.3.2 Membership

New Members, Jim Antweiler (Square D), Ernst Hanique (Smit), Javier Arteaga (MagneTek), Edward Adolphson (Consultant), Joseph Melanson (Raytheon E & C), V. S. N. Sankar (Ontario Hydro), and Monroe Frazier (Entergy) were added to the roster. G. Sparagowski (Detroit Edison) and Dave Truax (Consultant) have resigned from the subcommittee. Membership now stands at 91.

7.7.4 Agenda Changes - None

7.7.5 Working Group Reports

7.7.5.1 Revision of C57.110 - R. P. (Rick) Marek

The meeting was held on Monday, September 26, 1994, at 2:50 p.m. in Milwaukee, WI with 20 members and 10 guests present.

The first order of business was the approval of the Dallas, TX minutes. They were approved without comment.

A survey will be submitted to members to obtain actual data, that will help estimate eddy loss distribution for various types and sizes of transformers. This table will be submitted by Don Kline on September 27, 1994.

The chair distributed 3 letters that where given to him with comments on Draft 2 of ANSI C57.110. One letter was submitted by James Deffenbaugh which be reviewed for consideration into Draft 3 of ANSI C57.110.

The remaining two letters were submitted by Max Cambre. The first letter dealt with the eddy current hot spot margin that is given section 4.2.2. The hot spot margin is a multiplier of 400%. Alternatives to this 400% factor were given, but the general consensus was that this safety factor depends greatly upon rating and construction of the transformer. It was decided that words should be added to indicate that use of the 400% is a generally safe margin but the user should consult the manufacture for a multiplier if there is any concern for a particular application. If a multiplier is not available then the safety factor margin of 400% should be applied.

The chair questioned comments on limiting the scope of the 400% multiplier to 2500 kVA and below. The general consensus of the group is that no restrictions should be added to this section.

The second letter submitted by Max Cambre discussed an alternative temperature test method for section 5.0. A formula was proposed for a test current based on the harmonic loading factor and the eddy loss. The chair commented that section 5.0 still needs alternative test methods that should be submitted by members, this may include loss measurement, additional temperature rise procedures or any other performance characteristic considered necessary.

It was also noted that any bibliographies for ANSI C57.110 should be submitted to the chair for addition to the standard. The chair requested comments on Draft 2 (if any) with particular attention to sections 1.4, 2.5, 3.8, 4.2.2, and 5.0. Some comments were given during the meeting and the Draft was revised. Dudley Galloway will submit samples of oil filled transformer for sections 3.0 and 4.0 of ANSI C57.110.

The chair questioned if any members, in practice, had used ANSI C57.110 for derating an existing large liquid filled transformer. The response was limited and it was decided that this question should be proposed to the Performance Characteristics Subcommittee.

The meeting was then adjourned at 4:10 p.m.

7.7.5.2 Loss Tolerance and Measurement - W. R. (Bill) Henning

The WG on Loss Tolerances and Measurement met on Monday, September 26, 1994 in Milwaukee, Wisconsin, at the Pfister Hotel. We had record-breaking attendance figures of 17 members and 28 guests attending. After introduction and approval of the minutes, there were two task force reports.

Ramsis Grigis reported that the Guide for Transformer Loss Measurement (attendance: 16 M/G) is nearly complete. Still needed is some text that may be included from Eddy So's Instrumentation Guide. Also a section will be added, which explains the conditions under which a correction should be made for power loss and voltage drop in the shorting connection during a load loss test. Several correction methods will be discussed in the guide . The scope of the Guide will continue to cover loss measurements for dry-type transformers.

Eddy So reported on the Guide of Instrumentation for high Voltage, Low Power Factor Power measurement (attendance: 33 M/G). Subjects for discussion included "How are uncertainties derived?" and "What should be the recommended calibration intervals for instruments?"

Oskars Peterson of NIST presented a report on his review of Testing Requirements for Distribution Transformers for Efficiency within Provisions of the Energy Policy Act of 1992. Oscars' report is part of a study being conducted for DOE by the Oak Ridge National Laboratory. It appears that our newly revised C57.12.00 and C57.12.90 standards satisfy the requirements for liquid-filled distribution transformers.

The final subject of discussion in our working group was the subject of Tolerance on Losses as described in Table 19 of C57.12.00. Dr. Werner Stein had submitted a negative vote on this matter during the last general revision of C57.12.00. As a result of Working Group discussion, it appears that most working groups members also are not satisfied with the present Table 19. As a working Group Exercise, we will conduct the following ballot among Working Group Members: Vote on whether to eliminate Table 19, and simply state that the tolerance on no-load losses as reported after test is 10% of the guaranteed value for no-load losses and 6% of the guaranteed value of total losses for each unit being tested.

7.7.5.3 Semi-Conductor Rectifier Transformers - S. P. (Sheldon) Kennedy

The Working Group met on Monday, September 26, 1994 at 8:00 a.m. and 9:30 a.m. There were 13 members and 9 guests present.

Minutes on the March 20, 1994 meeting in Dallas, TX were approved.

Tony Siebert announced that there would be a plant tour of the ABB Power Electronics Facility in New Berlin. This was available to the Working Group as well as C57.110 members. The trip was scheduled for Monday evening.

Don Kline also announced that a reorganization meeting of the C34.2 Rectifier Working Group of IAS would be held in Denver, Colorado next Monday. This would be held during the IAS meetings.

BIL specifications will be deleted from the C57.18.10 standard based on the unanimous balloting of the Working Group. Explanatory notes will be included in the standard that these should be specified by the user when required due to the special nature of rectifier applications. Unless specified and agreed to in advance, impulse testing of secondary windings is not a requirement of the standard.

A question was raised concerning secondary winding hi-pot requirements of interleaved windings with regard to one another, these are typically low voltage and do not normally have high dielectric stresses to one another. It was decided that these windings still must be subjected to full hi-pot tests to ground. Unless specified otherwise, the hi-pot test levels to one another will be twice operating voltage plus 1000 volts rounded up to the nearest 500 volts, but in no case less than 2500 volts.

In conjunction with this question was another one regarding impulse testing of Bifilar Windings, typically one cannot achieve standard waveforms for these tests due to the high capacitance of these windings. Per normal impulse test methods, it would be acceptable to tie all of the terminals together for the impulse test. However, the Bifilar Windings shall not be tested to one another. They may be tested to ground and to the high voltage winding. Again, impulse test will only be performed when specified. Impulse testing of windings connected to rectifier terminals is not a requirement of this standard.

Another concern was raised regarding thermal testing of loosely coupled secondary windings which are located axially above one another. The primary rise by resistance is the average of both windings since they are paralleled at the terminals, however, each secondary is test individually . The upper of the two windings must have additional thermal compensation since it is in a higher ambient. Could the winding rises be averaged if the hottest-spot temperature allowance wasn't exceeded? Due to much new work being performed by other working groups concerning hot spot temperatures, it was decided to table this question for now. Each winding most continue to be evaluated individually.

Don Kline's Task Force on harmonizing with the IEC converter draft reported next. Joe Foldi confirmed the 0.8 exponent for bus connections, Joe also reported that the 0.8 exponent or stray losses varied with frequency, but should be no higher than 0.8, as well. It was recommended that these values be adopted the harmonize with IEC.

Next Don Kline presented several papers on a variety of topics. These lead up to his recommendation regarding using fundamental kVA (the new IEC method) versus RMS kVA (the traditional method) in order to rate a rectifier transformer.

In one paper, it was shown that harmonics decrease with load. Theoretical harmonic magnitudes exit only at no load.

Another paper showed that using the fundamental current was technically correct in order to express transformer kVA in relation to the real power supplied by the rectifier. Data on the harmonics present over the entire load range must be presented by the user to the manufacturer for this method.

Don also presented a paper which verified that in tightly coupled windings, 5th and 7th harmonics may be reduced to virtually zero due to electromagnetic cancellation. However, the 11th and 13th harmonics experience additive effects and are nearly doubled. In uncoupled windings, the harmonics are essentially the same in both windings. This also confirms some of the work in the IEC converter draft.

In a separate paper, Don showed that the secondary windings of circuit 31 transformers may be series connected for the purposes of impedance tests and heat run tests. He believes similar tests may be performed on circuit 45 and 46 transformers.

The working group will be balloted to see if they agree to accept the change to fundamental kVA from RMS kVA. If accepted extensive work may be necessary relative to nameplates, testing and all of the tables in the standard. Rectifier manufactures should also agree with this method as they must supply more data. Also, the IEC converter draft uses the fundamental kVA while keeping all other valves in RMS terms in the tables and calculations. The chair expressed concern that the possible added work may further delay completion of the standard. Deadline of the PAR will be checked.

The meeting adjourned at 10:45 a.m.

7.7.5.4 LTC Performance Requirements - T. P. (Tom) Traub

The LTC Performance Requirements Working Group met at 1:20 p.m. on Monday September 26, 1994 with 14 members and 27 guest in attendance. Introductions were made and the minutes of the previous meeting were approved.

The Chair explained that members of the Dielectric Test Subcommittee and the Performance Characteristics Subcommittee had been contacted by letter to determine if any of the members would change his or her note on PC 57.131, standard requirements for load tapchangers, as a result of changes made at the last meeting to resolve two negative ballots. The changes made did not cause any of the affirmative ballots to be changed to negative. Therefore, the chair had the entire document updated and sent to IEEE for transformers committee balloting. The returned ballots are due no later than October 6, 1994.

The IEEE office sent the chair all ballots with comments that had been received so far, and which were discussed at the Working Group Meeting. The ballots received by IEEE as of September 21, 1994 were less than one-half of those that were sent out. The results as of that date are: 61 affirmative, 3 affirmative with comments, 9 abstentions and no negatives.

The meeting consisted of a discussion of the comments received with there of the ballots and comments from the SCCIO coordinator, Mr. Stephen Huffman. Mr. Huffman states in a letter dated September 8, 1994 that PC57.131/D9 meets SCCIO requirements for approval, but made several comments and suggestions.

The following changes, which are editorial in nature, will be made to the proposed standard:

- Better identification of the HV and LV leads shown in figure E4 which shows LTC connections for autotransformers.
- A designation will be made in Figures E5, E6, E7 and E8 that the diagrams shown are for resistance type LTCs.
- The definitions in Clause 3 will be listed in alphabetical order per IEEE Style Manual instead of functionally grouped.
- The terms being defined will be in small case rather than capitalized per IEEE Style Manual.
- All terms being defined will appear as main terms and sublevel numbering will be eliminated.

- No new definitions will be added to the proposed standard.

Following the receipt of the remaining ballots, the Chair will review any comments received and resolve them, as required, and if necessary, by letter to the Spring Transformers Committee meeting.

The meeting adjourned at 2:20 p.m.

7.7.5.5 Revisions to C57.12.00 - P. E. (Peter) Krause

The working Group met at 1:20 p.m. on Monday, September 26, 1994 with 21 members and guests present.

Discussed three nameplate issues which have been balloted since the Dallas meeting:

a. A statement that no detectable PCB's were present in the transformer at time of manufacture.

b. Requirement that the month/year of manufacture be added to nameplate.

c. A footnote excepting 150 kV BIL transformers from list of approximate weights of various masses.

Don Platts presented the results of his TF on Cooling Class Designation (attendance: 20, M/G). The TF considered some sort of transitioning from the new IEC standard as edited by Fred Elliot with addition of a table which compares the old and new methods.

The above four issues will be balloted the Subcommittee prior to Kansas City to give us a chance to get all four into the next C57 edition.

New Business:

Sharma (Nova Scotia Power) and Subhash Tuli (MagneTek) both proposed addition of dielectric withstand testing of power transformer low-voltage wiring including instrument transformer secondary wiring.

Another new proposal by Mr. Tuli is to re-order Table 17 which he feels is misleading to some users who insist testing be ordered the same as the table. (Table 17 lists Routine and Design tests).

These issues will be balloted in the WG prior to Spring and report upon in more detail then.

The meeting adjourned at 2:25 p.m.

7.7.5.6 Revisions to C57.12.90 - Nigel P. McQuin

The WG met in the McKinley/Taft on Monday, September 26, 1994 at 9:30 a.m. The roster recorded 4 members in attendance, and 15 guests. Five of the guests requested membership of the WG.

The Dallas, TX minutes were approved without change.

The status of the administration process related to the PARs for Part 1 and Part II of the standard was presented. At present the work on the two parts is being covered in a single WG, but it is the intent to split the effort in to two WGs to match the procedural structure by the Spring meeting.

A new test report data revision was presented for discussion. The final document will be balloted by the WG in November, and the WG requests remission to ballot the SC on this item before the Spring meeting.

A status report was given on progress on revisions to the LVI test procedure. At present expertise from users, and original drafters, are being sought to support this effort. A first draft of revised text will be prepared and be available for discussion at the Spring meeting.

A new item of business was raised relating to the inclusion of the Frequency Response Analysis (FRA) method being adopted as on alternative diagnostic analysis test for short circuit test evaluation. A brief description of the method was given, and the history of its development. The Chair will be seeking comments and expertise on this method, and will report at the next meeting so as a decision can be made whether to proceed with this item.

The meeting was adjourned at 10:25 a.m.

7.7.6 Project Reports

7.7.6.1 Survey of GSU Transformer Failures - H. F. Light

Task force met Monday, September 26, 1994 at 11:00 am at the Pfister Hotel in Milwaukee, WI. Nine members and seven guests were present.

Survey replies have been received from 88 of 122 companies contacted. Between now and the next meeting the chair will send one last letter to those companies not responding.

Volume I containing the failure forms is just about ready for publication. Bipin Patel has agreed to follow up the letter with phone calls for the first seventeen companies not responding and the Task Force Chair will contact the remaining seventeen.

Volume II containing the details will be edited and proposed for publication also, this will allow simultaneous publication of both documents, which should take place within the next twelve months.

A response was received from IEEE regarding the publication of these documents. Of the proposals presented it is the task force opinion that submission to Technical Council for approval as a PES special publication was the best approach.

The meeting was adjourned at 11:45 a.m.

7.7.6.2 Reaffirmation of C57.116 - G. J. (George) Reitter

The main committee balloting of the document was successful without any negative ballot. The standard has been sent to the RevCom for approval.

7.7.6.3 C37.91 Guide for Relay Application - R. L. (Ron) Barker

Will report progress at next meeting.

7.7.7 Old Business - None

7.7.8 New Business - None

7.10.9 Next Meeting

The next meeting will be held on Tuesday, April 25, 1995 in Kansas City, MO.

The meeting adjourned at 10:28 a.m.

Respectfully submitted,
B. K. Patel
PCS Chair

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: PERFORMANCE CHARACTERISTICS / CHAIRPERSON: BIPIN PATEL / PHONE: (205)877-7740 / FAX: (205)868-5103

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION / PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.00	GENERAL REQUIREMENTS FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS							WORKING ON COOLING CLASS, NP
PC57.12.00m	PCS REVISION OF C57.12.00	KRAUSE P.		/ /	/ /	0	(303)275-27301	TABLE 19 WILL BE REMOVED
C57.12.90	GUIDE FOR SHORT-CIRCUIT TESTING OF DISTRIBUTION AND POWER TRANSFORMERS							TO REQUEST PAR
PC57.12.90h	PCS REVISION OF C57.12.90	McQUIN M.		/ /	/ /	0	(412)829-1205	TO SPLIT FROM TEST CODE
C57.18.10	REQUIREMENTS FOR SEMICONDUCTOR RECTIFIER TRANSFORMERS			NONE				
PC57.18.10	SEMI-CONDUCTOR RECT TR	KENNEDY S. P.		/ /	12/28/81	0	(716)896-6500	PAR HAS BEEN FOUND
C57.21	REQUIREMENTS,TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA			EM	T&D	PSR		COMPLETE
PC57.21	TEST CODE FOR SHUNT REACTORS	McGILL J. W.		04/02/91	06/09/88	1995	(414)475-3422	ANSI APPROVED 08/09/91
C57.105	GUIDE FOR APPLICATION OF TRANSFORMER CONNECTIONS IN THREE-PHASE DISTRIBUTION SYSTEMS							REAFFIRMED BY SB 06/17/92
PC57.105	PROJECT	REITTER G.		06/17/92	/ /	1997	(415)591-4463	BEING BALLOTED IN C57
C57.109	GUIDE FOR THROUGH-FAULT CURRENT DURATION			PSR				WILL BALLOT C57
PC57.109	SHORT-CIRCUIT DURATION	PATEL B.		03/16/93	06/27/91	1998	(203)499-3692	COMPLETE
C57.110	RECOMMENDED PRACTICE FOR ESTABLISHING TRANSFORMER CAPABILITY WHEN SUPPLYING NONSINUSOIDAL LOAD CURRENTS			T&D	PSR	NEMA		REAF. ANSI 07/93
PC57.110	REVISION OF C57.110	MAREK R. P.		12/03/92	09/15/93	1997	(804)838-8080	PAR APPROVED 09/15/93
C57.116	GUIDE FOR TRANSFORMERS DIRECTLTY CONNECTED TO GENERATORS							REAF BALLOT SUCCESSFUL
NONE	TR DIRECTLY CONNECTED TO GEN	REITTER G.		01/03/89	/ /	1994	(415)508-2864	SUBMIT REAFFIRMATION TO SB
C57.117	GUIDE FOR REPORTING FAILURE DATA FOR POWER TRANSFORMERS AND SHUNT REACTORS							REAFFIRMED BY SB 06/17/92
P786	TRANSFORMER RELIABILITY	ALTMAN M.		06/17/92	/ /	1997	(407)694-4975	ANSI APPROVED 7/93

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: PERFORMANCE CHARACTERISTICS / CHAIRPERSON: BIPIN PATEL / PHONE: (205)877-7740 / FAX: (205)868-5103

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION: PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.123	GUIDE FOR TRANSFORMER LOSS MEASUREMENT							TF WORKING
P1098	LOSS TOLERANCE AND MEASUREMENT HENNING W. R.		RAMSIS GIRGIS	/ /	06/13/85	0	(414)547-0121	
C57.125	GUIDE FOR FAILURE INVESTIGATION, DOCUMENTATION AND ANALYSIS FOR POWER TRANSFORMERS AND SHUNT REACTORS			T&D	ED&PG	PSE	SWGR	
PC57.125	FAILURE ANALYSIS	ALTMAN M.		06/27/91	06/28/87	1996	(407)694-4975	ANSI APPROVED 11/20/91
C57.131	REQUIREMENTS FOR LOAD TAP CHANGERS			EM	T&D			BALLOTING MAIN COMMITTEE
PC57.131	LTC PERFORMANCE REQUIREMENTS	TRAUB T. P.		/ /	08/17/89	0	(394)294-2704	SUBMIT DOCUMENT TO SB
IEEE 638	QUALIFICATION OF CLASS 1E TR FOR NUCLEAR POWER GENERATING STATIONS			NPE	SUB	SC2	SCC10	APPROVED BY SB 03/18/92
P638	QUALIFICATION OF TR FOR 1E APP PIERCE L. W.			/ /	10/29/90	1997	(706)291-3166	NEW PAR APPROVED 12/04/90

COORDINATION ACTIVITY OF PERFORMANCE CHARACTERISTICS SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE	PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD.PHONE
NEW	MEASUREMENT OF POWER AT LOW POWER FACTOR					
02/15/94		PSIM	EDDY SO	613-993-2660	W. R. HENNING	414-547-0121
PC37.109	GUIDE FOR THE PROTECTION OF SHUNT REACTORS					REAFFIRMED 1993
03/28/85		PSR	LAVERN L. DVORAK	303-231-1636	MIKE ALTMAN	407-694-4975
PC37.91	GUIDE FOR PROTECTIVE RELAY APPLICATION TO POWER TRANSFORMERS					
03/19/92		PSR	MIRIAM SANDERS	919-856-2457	RON BARKER	804-257-4671
PC37.10	GUIDE FOR DIAGNOSTICS AND FAILURE INVESTIGATION OF POWER CIRCUIT BREAKERS					DRAFT IN REVISION IN WG
05/01/91		SWGR	L. ROLANDO SAAVEDRA	504-363-8765	WALLACE B. BINDER JR.	216-384-5625

7.8 Underground Transformers & Network Protectors - P. E. Orehek

7.8.1 Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met at 9:30 A.M. on September 27, 1994 with 15 members and four guests present.

7.8.2 Approval of Minutes

The minutes of the March 22, 1994 meeting in Dallas were approved as written.

7.8.3 Membership

Membership has decreased to 19 with the resignation of two members and the addition of one new member. The following two members have resigned:

J. W. Howard - Pennsylvania Power and Light Company
T. R. Balgie - Virginia Power Company

The following has become a new member:

W. Wimmer - Virginia Power Company

Applications for membership in the Transformers Committee by P. G. Risse of Georgia Power and R. D. Graham of Hipotronics were approved. Congratulations Pete and Rich.

7.7.4 Chair's Remarks

Administrative Subcommittee Notes:

A. J. W. Howard of Pennsylvania Power and Light Company has resigned as Chair of the Underground-Type Three-Phase Distribution Transformers Working Group and C. G. Niemann of Commonwealth Edison Company has been appointed the new Chair. Also, R. B. Robertson of Tampa Electric Company has resigned as Chair of the Secondary Network Protectors Working Group and D. H. Mulkey of Pacific Gas and Electric Company has been appointed the new Chair.

B. All Panel Sessions now being planned are for 1996 since it is now too late for the 1995 SPM. Our Subcommittee is to consider having a Panel Session at the next T&D Conference and Exposition in September, 1996.

C. The Memorandum of Understanding between IEEE and NEMA as co-secretariats of C37 and C57 was finalized and approved in April, 1994. The MOU affirms the intent for cooperation between IEEE and NEMA. The MOU provides for each organization to submit its own standards to ANSI, with notification to the other organization. Also, each organization will publish its standards following ANSI recognition.

D. The NEMA trademark claim to ownership of the "C57" designation is still unresolved. It may take up to 18 months to get a decision.

E. When a Working Group wants to reaffirm a Standard, no changes of any type can be made to the Standard when it is balloted.

F. The next Transformer Committee Meeting scheduled for April, 1995, will be held at the Hyatt Regency Crown Center Complex, Kansas City, Missouri.

7.8.5 Working Group Reports

7.8.5.1 Three-Phase Underground-Type Transformers (C57.12.24) (C. G. Niemann - Chair)

The Working Group met at 1:20 p. m. on September 26, 1994 with 11 members and five guests present.

The minutes of the March 21, 1994 meeting were approved as written.

J. W. Howard, who was Chair of this Working Group, had to resign and C. G. Niemann was appointed as the new Chair.

The revised Standard was approved by the IEEE Standards Board on March 17, 1994 and by ANSI on May 23, 1994. The Chair is still trying to determine when the revised Standard will be published.

At the last Working Group meeting, IEEE Staff stated that if they were to publish this document that metric units would be included during the final editing of the Standard. Since ANSI will be publishing this Standard the Working Group asked what is ANSI policy for metrics. Subsequently, it was determined that it was similar to IEEE's policy. It is not known whether metric units will be included when the Standard is published. Also, any other changes made by IEEE Staff at the last Working Group meeting would not be included since IEEE is not doing the editing.

The meeting adjourned at 2:10 p. m.

7.8.5.2 Secondary Network Transformers-Liquid Filled (C57.12.40) (E. A. Bertolini - Chair)

The Working Group met on at 2:50 p. m. on September 26, 1994 with 14 members and one guest present.

The minutes of the March 21, 1994 meeting were approved as written.

J. W. Howard and T. R. Balgie resigned from this Working Group and W. Wimmer of Virginia Power became a new member.

R. L. Plaster made a presentation on the background of the use of 55 degree C rise transformers. It was noted that since 1977, C57.12.00 did not recognize 55 degree C rated transformers. It was

estimated that users specify both 55 and 65 degree C ratings on an equal basis. The Working Group is going to review the use of both ratings for inclusion in the next revision.

A brief discussion took place on the use of "O" ring seals for the ground switch handle and on a welded-on magnetic liquid level gauge. The members showed no interest in the liquid level gauge but will pursue the use of "O" ring seals for the ground switch.

Use of silicone fluid in these transformers was discussed. It was stated that there were no manufacturing problems when using this fluid but several considerations should be known when this fluid is used. These considerations will be included with the Working Group minutes.

C. G. Niemann provided a sketch for transformers specified in Part I of the Standard showing the relocation of the drain plug, filling plug, air test provision, and the magnetic liquid level gauge for discussion and review at the next meeting.

This Standard was approved by the IEEE Standards Board in December, 1993 and it is supposedly now at the ANSI Board of Standards Review. The Working Group would like to see this standard published ASAP.

The meeting adjourned at 4:00 p. m.

7.8.5.3 Secondary Network Protectors (C57.12.44) (R. B. Robertson - Chair)

The Working Group met at 8:00 a. m. on September 26, 1994 for three sessions with 12 members and one guest present.

The minutes of the March 21, 1994 meeting were approved as written.

J. W. Howard and T. R. Balgie resigned from this Working Group and W. Wimmer of Virginia Power and J. L. Harper of Arizona Public Service, who was a past active member but unable to attend meetings due to work assignment, joined the Working Group.

This newly developed Standard was approved by the IEEE Standards Board on March 17, 1994 and by ANSI on May 23, 1994. IEEE Staff indicated that document editing would be completed the first week of October and than forwarded to the Working Group Chair for review. Hopefully this document will be published this year.

It was noted that a new PAR will be needed to continue revisions to the Standard when it is published.

The Working Group reviewed revisions to new generic network protector fuse curves for informative Annex B of the Standard.

Comments returned during the balloting process were reviewed and the Working Group will consider including them in the first revision.

R. B. Robertson announced that he was going to retire this year and would resign as Chair of the Working Group after this meeting. D. H. Mulkey of Pacific Gas and Electric and the present Secretary of the Working Group was appointed to be the new Chair.

The meeting adjourned at 12:10 p. m.

7.8.5.4 Three-Phase Dry-Type Network Transformers (C57.12.57) (B. Nutt - Chair)

The Working Group met at 4:15 p. m. on September 26, 1994 with 10 members and two guests present.

The minutes of the March 21, 1994 meeting were approved as written.

Draft #6 was balloted and approved by the Subcommittee and will now be sent to IEEE for balloting in the Main Committee and the ASC C57 Transformers Committee concurrently.

The meeting adjourned at 4:45 p. m.

7.8.6 Old Business

The Subcommittee's request to standardize on impedance terminology didn't receive a favorable response since it was felt that adequate definitions exist. The Subcommittee decided it was a moot point and dropped the issue.

The Subcommittee's request to include a requirement on the nameplate of transformers that states the "Maximum PCB content of dielectric fluid at time of manufacture in parts per million" is in the approval process.

7.8.7 Other Business

R. B. Robertson of Tampa Electric, who is retiring, chaired his final meeting for the Secondary Network Protectors Working Group. The Chair commended him for his dedicated service to the Working Group and Subcommittee. He achieved his goal of completing the development of the Network Protector Standard before he retired. He would really like to see the standard published before the end of the year when he retires. The Chair thanked R. B. for all his work and fine friendship and wished him well in his retirement.

The Chair also expressed his appreciation to J. W. Howard of Pennsylvania Power and Light Company who had the unfortunate experience of having his job eliminated. Jim was Chair of the Three-Phase Underground-Type Distribution Transformers Working Group for about 15 years and was a credit to the Working Group and Subcommittee. His experience and dedication will be missed and the Subcommittee wishes him well in finding a new position.

7.8.8 Future Meetings

The location and dates scheduled for future meetings are as follows:

April 23-26, 1995 Kansas City, Missouri

November 5-9, 1995	Boston, Massachusetts
April 13-17, 1996	San Francisco, California

The Subcommittee adjourned at 10:15 a. m.

Respectfully submitted,
Paul E. Orehek, Chair

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: UG TR & NETWORK PROTECTORS / CHAIRPERSON: PAUL OREHEK / PHONE: (201)430-7743 / FAX: (201)242-8740

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION / PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.24	UNDERGROUND-TYPE 3-PHASE DIST- RIBUTION TRANSFORMERS,2500kVA AND SMALLER: HV,34500GrdY..& BELOW,LV,480 V AND BELOW	T&D	IC	IAS/REP	IAC/PSE			WILL BE PUBLISHED BY NEMA
PC57.12.24	3-PHASE UG-TYPE TRANSFORMERS	NIEMANN C.		05/10/88	06/27/91	1993	(708)450-5307	ANSI APPROVED 05/23/94
C57.12.40	REQUIREMENTS FOR SECONDARY NETWORK TRANSFORMERS, SUBWAY & VAULT TYPES (LIQUID IMMERSED)	SCC14						REVISION APPR. BY SB 12/02/93
PC57.12.40	LIQUID-FILLED NETWORK TRANSFMR	BERTOLINI E. A.		03/19/92	12/05/91	1997	(212)460-4913	WAITING ANSI APPROVAL
C57.12.44	STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS	T&D	SWGR	IAS/REP	IAS/PSE	EEI		TO BE PUBLISHED
PC57.12.44	SECONDARY NETWORK PROTECTORS	MULKEY D. H.		/ /	06/17/92	0	(415)973-4699	ANSI APPROVED 05/23/94
C57.12.57	REQUIREMENTS FOR VENTILATED DRY-TYPE NETWORK TRANSFORMERS 2500kVA AND BELOW, H/HV 34500V AND BELOW,LV 216Y..AND 480Y..	T&D	EEI/T&D SCC14					TO BALLOT D6 IN TC
PC57.12.57	DRY-TYPE NETWORK TRANSFORMERS	NUTT B.		03/18/92	12/05/91	1997	(214)698-7447	REAFFIRMED 03/18/92

COORDINATION ACTIVITY OF UG TR & NETWORK PROTECTORS SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE	PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD.PHONE
PC37.108	GUIDE FOR THE PROTECTION OF NETWORK TRANSFORMERS					
09/28/84		PSR	THOMAS E. WIEDMAN	312-394-2593	D. H. MULKEY	REAFFIRMED 1994 415-973-4699
PC62.2.01	APPLICATION GUIDE FOR SURGE PROTECTION OF ELECTRIC GENERATING PLANTS					
06/01/84		SPD	G. L. GAIBROIS	313-237-9332	D. H. MULKEY	415-973-4699

7.9 West Coast - D. S. Brucker

IEEE WEST COAST TRANSFORMER SUBCOMMITTEE
MEETING MINUTES
FRIDAY, OCTOBER 21, 1994
LAS VEGAS, NEVADA

The meeting was called to order by chair Dave Brucker at 8:30 AM. Members and guests were introduced. The meeting minutes from the Portland Meeting were read by Secretary/Vice Chair Gary McCulla. They were approved with minor correction.

7.9.1 Old Business

7.9.1.1 Transformer Fire Protection Guide

Everett Hagar suggested the WCTSC stop work on the Transformer Fire Protection Guide. After reviewing Draft 11 of the *Guide for Substation Fire Protection* the committee agreed that the transformer guide was redundant. The substation fire protection guide contained sufficient information on transformers. A motion was made and passed that Dave Brucker contact the main Transformers Committee and inform them of this recommendation.

Any necessary coordination between the ourselves and the substation fire protection working group will be handled by Everett Hagar.

7.9.1.2 Phase Shifting Guide

An organizational meeting was held on October 20, 1994. The scope was discussed and working group members volunteered to research specific topics.

Dave suggested the Project Authorization Request be submitted by November 15, 1994.

The next working group meeting will be held at the Main Transformers Committee meeting in Kansas City in April 1995. A phase shifting transformer tutorial will be planned as part of this working group meeting. Dave Brucker will coordinate the arrangements for the working group meeting and the proposed tutorial with the main committee.

7.9.2 New Business

Dave recommended all members consider getting access to the Internet. E Mail is seen as an efficient way to review draft Standards. This is discussed in a recent article in the *Institute*. I have enclosed a copy of this article.

Everett Hagar volunteered to be the point of contact for any future changes in the Loss Guides.

It was suggested the WCTSC consider a Grounding Transformer Application Guide as a future project. John Norberg graciously volunteered to be the point of contact for this effort.

It was also suggested the WCTSC consider a Mobile Transformer Applications Guide as a future project. Tom Prange graciously volunteered to be the point of contact for this effort. It was suggested the scope should include primary voltages of 34.5 kV to 138 kV.

Dave Brucker will discuss both of these items with the main Committee.

7.9.3 Next Meeting

It was agreed that we would meet the week of May 8, 1995 with the West Coast Substations Subcommittee in San Diego.

The meeting was adjourned at approximately 9:20 AM by Dave Brucker.

After lunch a tour of the Nevada Power Company's Harry Allen Substation was held.

Our thanks to Nevada Power and in particular Bill Revell for arranging the meeting room and the station tour.

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: WEST COAST / CHAIRPERSON: DAVID BRUCKER / PHONE: (415)692-4431 / FAX: (415)692-0483

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION: PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.11	GUIDE FOR INSTALLATION OF OIL-IMMERSED TRANSFORMERS (10MVA & LARGER, 69-287kV RATING)							TO BE REPLACED BY C57.93
PC57.93	CON. INSTALLATION GUIDES	GILLIES D. A.		05/09/80	/ /	1992	(503)622-4847	LIFE EXTENSION TO 12/92
C57.12.12	GUIDE FOR INSTALLATION OF OIL-IMMERSED TRANSFORMERS 345kV AND ABOVE							TO BE REPLACED BY C57.93
PC57.93	CON. INSTALLATION GUIDES	GILLIES D. A.		05/09/80	/ /	1992	(503)622-4847	LIFE EXTENSION TO 12/92
C57.93	GUIDE FOR INSTALLATION OF LIQUID-IMMERSED POWER TRANSFORMERS.			NONE				BALLOTING REV. IN TC 04/26
PC57.93	CONSOLIDATION OF INST. GUIDES	GILLIES D. A.		/ /	06/01/89	0	(503)622-4847	WITHDRAW 12.11/12.12 WHEN APP.
C57.114	SEISMIC GUIDE FOR POWER TRANSFORMERS AND REACTORS			NPE	SUBS.			TO BE WITHDRAWN (OBSOLETE)
P513	SIESMIC GUIDE	OKLU S.		02/15/90	09/06/73	1995	(213)481-4823	ANSI APPROVED 08/09/91
C57.120	LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS			SUB	EM	ED&PG	IAS	IEC	PUBLISHED 1992
P942	LOSS EVALUATION GUIDE	JACOBSEN R.		12/03/91	05/01/80		1996		APPROVED BY ANSI 02/28/92
C57.128	FIRE PROTECTION OF OUTDOOR LIQUID-IMMERSED POWER TRANSFORMERS			NPE	SUB	PSR			DRAFT BEING PREPARED
PC57.128	FIRE PROTECTION	HAGER R.	NORBERG J.	/ /	06/01/89	0			
NEW	GUIDE FOR APPLICATION, TESTING, INSTALLATION AND OPERATION OF PHASE ANGLE SHIFTING TRANSFORMERS								NEW PROJECT
NEW	PHASE ANGLE SHIFTING TRANSFO.	McCULLA G.	TRUMUER E. (WG)	/ /	/ /	0	(602)236-8621		PAR TO BE SUBMITTED

COORDINATION ACTIVITY OF WEST COAST SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE / PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD. PHONE
P1248	GUIDE FOR THE COMMISSIONING OF ELECTRICAL SYSTEMS IN HYDROELECTRIC POWER PLANTS				
12/06/90	ED&PG	LOUIS A. TAUBER	503-326-2323	D. A. GILLIES	503-622-4847
P 693	RECOMMENDED PRACTICE FOR SEISMIC DESIGN OF SUBSTATIONS				NEW PAR 12/93
09/18/90	SUBS	RULON FRONK	213-481-3327	DAVID BRUCKER	415-692-4431
P 979	GUIDE FOR SUBSTATION FIRE PROTECTION				MUST COMPLETE IN 1994
06/18/92	SUBS	A. J. BOLGER	604-663-2879	D. W. SUNDIN	414-524-3221
P1268	GUIDE FOR INSTALLING TEMPORARY SUBSTATIONS				D1 READY FOR WG COMMENTS
03/30/91	SUBS	SHASHI G. PATEL	404-362-5386	D. A. GILLIES	503-622-4847

7.10 Audible Sound and Vibration - J. Puri

The Subcommittee met on Tuesday, September 27th, at 2:00 P.M. in two sessions. Thirteen members and nineteen guests were present. Mr. Jin Sim was welcomed as a new member of this subcommittee.

The minutes of Dallas meeting were approved.

The group discussed the first draft of the "Siting Guide" prepared by Mr. Jack McGill - Chair of the Working group responsible for writing this guide.

The Subcommittee participants pointed out that the scope of the Siting Guide is very limited. Recognizing the future potential of this document, it was agreed that:

a. This document will be named as "Guide for Noise Control and Siting Liquid Filled Transformers."

b. The Guide will be split in two parts.

   Part I - will cover noise abatement techniques in old transformers.

   Part II - will address noise reduction and noise level specification issues in new transformers.

A revised scope and new outline for this document will be circulated among the subcommittee members. A PAR for this project will be requested. The WG will meet independently in Kansas City to further develop this document.

Mr. George Reitter presented a format for collecting standard noise level specifications for Power Transformers. This information is needed to update the present standard noise levels as published in NEMA TR1. This format will collect data on noise levels that manufacturers can supply with no additional charge to the users. This information will also cover the entire kVA and BIL range for modern power transformers.

Mr. Ernst Hanique presented an excellent tutorial on the techniques and theory of Noise Intensity measurements. This specially suitable for taking measurements under high ambient noise conditions. Dr. Ramsis Girgis offered his help in collecting additional background information on this subject. We agreed that one more session should be devoted to discussing this subject before initiating any work toward developing a test procedure for inclusion in the IEEE Standard C57.12.90.

There being no new business, our meeting adjourned at 4:45 P.M.

Jeewan Puri
Chair

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: AUDIBLE SOUND & VIBRATION / CHAIRPERSON: JEEWAN PURI / PHONE: (704)282-7413 / FAX: (704)282-7425

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION: PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.90 / PC57.12.90x	STANDARD ON SOUND INTENSITY MEASUREMENT		TULI S.	/ /	/ /	0		NEW TASK FORCE TO DRAFT STD ON MEASURING SOUND INTENSITY
C57.112 / P523	GUIDE FOR THE CONTROL OF TRANSFORMER SOUND / SUBCOMMITTEE	PURI J.		NONE / /	12/28/73	0	(704)282-7413	NEW TASK FORCE TO START WORK / CHECK FILES FOR NEWER PAR
NEW / NEW	GUIDE FOR NOISE CONTROL IN OIL-IMMERSED POWER TRANSFORMERS	McGILL J.		/ /	/ /	0	(414)475-3422	D1 READY / PAR NEEDED TO SUBMIT

COORDINATION ACTIVITY OF AUDIBLE SOUND AND VIBRATION SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE	PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD.PHONE
P 656 / 03/08/91	STANDARD FOR THE MEASUREMENT OF AUDIBLE NOISE FROM OVERHEAD TRANSMISSION LINES	T&D	JAMES R. STEWART	518-395-5025	ALAN M. TEPLITSKY	PUBLISHED 12/92 / 212-460-4859

7.11 Bushings - L. B. Wagenaar

MILWAUKEE, WI
SEPTEMBER 28, 1994

Chair L. B. Wagenaar opened the meeting at 2:00 PM and welcomed the members and guests. The meeting was attended by sixteen members and twenty guests. After the introduction of members and guests, the subcommittee attended to the following:

7.11.1 Chair's Remarks

Mr. Wagenaar made the following remarks after attending the Administrative Subcommittee meeting.

- Next meeting to be held in Kansas City
- PAR form is being changed by IEEE
- Guidelines on reviewing technical papers can be obtained from the IEEE

7.11.2 Approval of March 22, 1994 Minutes of Meeting held in Dallas, TX

The minutes were approved as written.

7.11.3 Working Group Report on Performance Characteristics and Dimensions for Outdoor Apparatus Bushings (PC57.19.01)

Chair P. Singh reported that his WG met on September 26, 1994 with eight members and fifteen guests. Two of the guests requested membership to the WG. He reported on the following:

1. Transformer-Breaker Interchangeable Bushings

   After reviewing the feedback from members and Doble Clients Survey and considering the fact that there is hardly any demand for these bushings on new oil circuit breakers, the working group decided to remove tables 4 and 6 from the existing standard C57.19.01. It is, however, understood from the bushing manufacturers that these bushings would still be available for replacement purposes.

2. Tables 1 & 2 (Electrical Insulation Characteristics)

   In order to promote the use of standard ratings (34.5, 69, 138, 230, 345, 500, 765), approved at the last meeting, the WG decided to keep only the above ratings in the tables. The other ratings will be listed in an Appendix for replacement bushings.

3. Table 5 (Dimensions for Outdoor Type Transformer Bushings)

The WG discussed P. Singh's proposal on dimensions and asked the members to bring to the meeting or send, their comments on the following:

a. Combine 400 A and 1200 A into one rating for 34.5 and 69 kV. These bushings should have a minimum tube ID of 0.875 for drawlead application and 1.5 - 12 thread for top and bottom terminals.

b. Change CT length and "L" dimension as follows:

kV	Current Range	CT Length	"L" Dimension
34.5	400/1200 - 5000	21	31.5
69	400/1200 - 3000	21	37.5

c. Change bottom terminal for 34.5 and 69 kV ratings to a bladed configuration for current ratings 2000 A and above.

d. Change flange mounting bolt hole size from .750 to .875

e. Drop the 5000 A rating for 69 kV as there is hardly any demand for this current rating.

4. Table 7(Dimensions for Bushings 138 kV and above)

The WG discussed P. Singh's proposal on dimensions of transformer bushings and asked the members to bring to the meeting or send their comments on the following:

a. Change the "L" dimension for 138 kV, 800 Amp. bushing to 46.75. This will make the "L" dimension consistent with 2000 and 3000 Amp ratings.

b. Change CT length for 230 and 500 kV ratings to 23 inch to make it consistent with other ratings.

c. Change minimum tube ID for 500 and 765 kV for 800 A ratings to 2 inch.

Gene Blackburn, after the meeting indicated that he would be representing Georgia Power in place of Mr. D. E. Parr who has retired.

7.11.4 Working Group Report on Bushings for DC Applications PC57.19.03)

Chair Olof Heyman reported that his WG met on September 26, 1994 with ten members and nine guests. He reported on the following:

1. Results of Joint Ballot on Draft 10 (WG and Bushing Subcommittee)

Sent	Returned	Approved	Approved with comments	Not approved	Abstain
49	32	14	11	3	4

2. Discussions on Comments on Draft 10

In addition to a number of editorial comments the following were discussed and agreed. Detailed comments are listed in the attachment.

a. Cast insulation bushings will be removed from this standard as they are not a part of the scope.

b. It was apparent that there is a lot of confusion about thermal ratings of bushings and the test procedure. In the present standard(C57.19.00) the maximum temperature of the insulation material of temperature index 105 is 105 C. The temperature rise test is carried out with the lower end of the bushing immersed in transformer oil with 55 C rise above ambient air. This gives a maximum allowable hot spot temperature rise of 65 C over 40 C ambient air.

A note afterwards states that bushings that pass the thermal basis of rating tests are suitable for use in 65 C rise oil filled transformers. The oil temperature in these transformers is limited to 95 C averaged over 24 hour period, which is equivalent to conditions used in the bushing thermal test.

In order to clarify the thermal basis of rating, Loren Wagenaar, Olof Heyman and P, Singh agreed to write a recommended wording and a procedure for this test.

c. It was agreed to perform the chopped wave test at 1.15 times the specified lightning impulse test level.

d. A clarification on test specimen requirement will be made for wall bushing so as to make sure that mounting conditions during test are similar to those in service.

e. It was agreed to change the calculation basis for test level for DC bushings. The revised procedure will use the maximum voltage in place of rated voltage for calculating the test level. This would mean an increase in test voltage of 5 -10 %.

f. Dr. Jens Frost and Olof Heyman agreed to write a procedure for the temperature rise test for wall bushings. This will be included in the next draft.

g. In order to clarify the definitions of DC bushings depending upon their application, Olof Heyman agreed to rewrite these for the next draft.

h. It was agreed to add a note about thermal rating of drawlead stating that the hot spot on the drawlead and the bushing is influenced by the combined effect of the drawlead dimension and the bushing.

i. The question about the extensive routine impulse testing was raised again. Neither IEC nor ANSI calls for these tests to be done on a routine basis. The new draft of IEC 137 calls for 5 negative FW tests as a routine on transformer bushings with system voltage 300 kV and above. As no agreement could be reached at the WG meeting, Olof Heyman agreed to write a proposal and ballot it within the WG.

7.11.5 Working Group Report on Bushing Application Guide (PC57.19.100)

Chair Fred Elliot reported that his working group met on September 26, 1994 with thirteen members and ten guests. He reported on the following:

Results of Ballot on Draft 11 (Bushing Subcommittee)

Sent	Returned	Approved	Approved with comments	Not approved	Abstain
141	106	82	14	0	10

All of the comments were editorial in nature. The major ones were discussed and will be incorporated into Draft 11. The WG agreed that these changes did not require any further balloting and decide to submit to the IEEE Standards Board, the corrected Draft 11 for approval as an IEEE Standard.

The WG also voted to withdraw the Trial Use Guide C57.19.101-1989 after the approval of PC57.19.100.

Future activities of this WG will be at the discretion of the Bushing Subcommittee.

7.11.6 Technical Advisor Report on IEC 36A

Technical Advisor Bill Saxon reported on the following activities.

1. Working Group 1, Bushings for Alternating Voltages Above 1000V, Revision of IEC137, Project 36A.9.2

   The latest draft was approved by the subcommittee with a vote of seventeen in favor, one abstention, and six not voting. The committee draft will be registered as Draft International Standard. (DIS)

2. Working Group 2, Guide for Seismic Qualification of Bushings, Project 36A9.4

   The committee draft has been submitted for comments and will be discussed at the next meeting.

3. Working Group 3 Interpretation of Dissolved Gas Analysis in Bushings where Oil is the Impregnating Medium, Project 36A.34.1

   No Information available at this time.

4. Direct Connection between Power Transformers and Gas Insulated Metal Enclosed Switchgear for Rated Voltages 72.5 kV and above

   This is a combined project of Technical Committees 14, 17, and 36. Draft 2 has been submitted for comments. The next meeting would be held in Brussels on October 24, 1994.

7.11.7 Application of Bushing Current Transformers

Loren Wagenaar reported on the results of a two part subcommittee ballot. This ballot dealt with the definition of Current Transformer Pocket Length and Bushing Current Transformer Application. In both parts only 47 % of ballots were returned. This would require a second ballot to be sent out. Two negative ballots were received on the proposed revision of to C57.12.00. One added a further requirement while the other stated that the new requirement was not necessary. Both points of view were presented at the meeting. The proponent of the proposal disclosed two cases where a flashover on the inside end, one through the gasket between the flange and lower porcelain and one inside the porcelain had hit the unshielded current transformer. In both cases an over-voltage occurred in the control cabinet. Fortunately no one was injured, but this shows that the possibility is present. The opponent of the proposal offered to withdraw his negative vote if the wording of the proposal is changed somewhat. Both modified proposals will be balloted within the subcommittee.

7.11.8 Loadability of Drawlead Bushings

The topic of loadability of drawlead was discussed in light of the report presented at the last meeting by Dr. Jurgen Jeske. It was decided to establish a task force where several individuals volunteered to participate. The task force will define the problem and recommend a solution. The task force will meet at the next meeting in Kansas City.

7.11.9 New Business

The subcommittee also discussed several topics under new business.

First, IEC 137 has a requirement for short time (short circuit) thermal rating of bushings and the method of calculation. A question was asked during previous discussions whether C57.19.100 should have a similar requirement. All those present felt that this was not a problem. No one could cite a problem where a bushing failed during a through short circuit fault. Loren Wagenaar agreed to ask the transformer committee for inputs on this requirement.

Second, a question was asked whether an outdoor bushing could be used for indoor application. In order to address this, Olof Heyman agreed to check IEC 137 to determine if it has any special requirements for indoor applications.

Third, the question was asked if the time had come to address the discrepancy between the thermal basis of current rating (55 C rise) and the application of the bushing to 65 C rise transformer. It was proposed that EEMAC policy of allowing hot spot 75 C rise in a bushing

immersed in 65 C rise oil be considered. P. Singh agreed to write a proposal on this subject for discussions at the next meeting.

Members were asked to bring any comments /need for additional items for discussions or change at the next meeting.

7.11.10 Adjournment

The meeting was adjourned at 4:50 PM

Minutes by:

Pritpal Singh, Secretary
Bushing Subcommittee

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: BUSHING / CHAIRPERSON: L. B. WAGENAAR / PHONE: (614)223-2259 / FAX: (614)223-2205

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION: PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.19.00	GENERAL REQUIREMENTS AND TEST PROCEDURES FOR OUTDOOR APPARATUS BUSHINGS (IEEE 21)			T&D	PSR	IC	SWGR	PUBLISHED 1992
PC57.19.00	SUBCOMMITTEE	WAGENAAR L. B.		07/23/76	04/01/79	1997	(614)223-2259	APPROVED BY ANSI 03/31/92
C57.19.01	STANDARD PERFORMANCE CHARACTERISTICS AND DIMENSIONS FOR OUTDOOR APPARATUS BUSHINGS (IEEE 24)			SPD	IAS	IC	SWGR	PUBLISHED 1992
PC57.19.01	REVISION TO C57.19.01	SINGH PRITPAL		08/05/83	11/01/89	1997	(901)696-5228	APPROVED BY ANSI 03/20/92
C57.19.03	STANDARD REQUIREMENTS, TERMINOLOGY AND TEST CODE FOR BUSHINGS FOR DC APPLICATIONS			SPD	IC	SWGR		WORKING ON DRAFT
PC57.19.03	BUSHINGS FOR DC APPLICATION	HEYMAN OLOF		/ /	11/09/89	0		SF6 BUSHINGS NOT INCLUDED
C57.19.100	GUIDE FOR APPLICATION OF APPARATUS BUSHINGS.			SWGR	SUB	PSR		REBALLOT OF TC CLOSED AUG 29
P800	BUSHING APPLICATION GUIDE	ELLIOTT F. E.		/ /	09/27/79	0	(503)230-3900	SUBMIT TO REVCOM
C57.19.101	GUIDE FOR LOADING POWER APPARATUS BUSHINGS							BALLOT TO WITHDRAW
P757	BUSHING APPLICATION GUIDE	ELLIOTT F. E.		10/20/88	/ /	1997	(503)230-3900	ANSI APPROVED 7/93

COORDINATION ACTIVITY OF BUSHINGS SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE	PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD.PHONE
PC37.04h	MECHANICAL LOADING REQUIREMENTS OF CIRCUIT BREAKER TERMINALS					SUPPLEMENT APPROVED 1991
09/28/90		SWGR	GEORGE R. HANKS	615-751-4020	LOREN B. WAGENAAR	614-223-2259
P 957	GUIDE FOR CLEANING INSULATORS					OLD GUIDE EXTENDED TO 12/94
09/17/92		T&D	WILLIAM L. GIBSON	415-973-3747	L. B. WAGENAAR	614-223-2259

7.12 Dielectric Tests - J. B. Templeton

The Subcommittee met at 10:55 on September 27, 1994 with 43 members and 41 guests present. Mr. Templeton was unable to attend and Mr. B. Poulin chaired the meeting.

The minutes from the March 22nd meeting in Dallas, TX were approved as submitted.

7.12.1 Working Group Reports

7.12.1.1 Working Group on Revision of Dielectric Tests - Bertrand Poulin, Chair

The Working Group met at 4:15 PM on September 26th with 29 members and 27 guests present. In order to save time, the usual introductions were skipped. The minutes of the Dallas meeting were approved as written. The task force reports were as follows:

7.12.1.1.1 Task Force on Metal Oxide Surge Arrester Coordination with Power Transformer Insulation - R. Degeneff, Chair

The meeting was called to order at 10:55 AM on September 26th with nine members and 26 guests present.

The chair presented a brief review of the task force mission. Essential points are that:

a) The voltage characteristics for silicone carbide and metal oxide arresters are different for the same system excitation, allowing the voltage held by the metal oxide surge arrester (MOSA) to have a higher voltage than the tail of the factory full wave.

b) The Arrester Protection and Coordination of Transformer Insulation Working Group of the Surge Arrester Protective Devices Committee requested that they be given a volt-time curve for coordination of arrester protective levels with insulation withstand strength for liquid-filled transformers.

c) In a letter from Loren Wagenaar to Yasu Musa of the Surge Protective Devices Committee a more conservative curve than presently used in C62.2 was suggested. This modification was questioned for a number of reasons and the task force has examined this issue and several others for the last two years.

The balance of the meeting was spent in discussing the validity of the volt-time insulation withstand strength curve and what form that general curve should take. Several valid questions in regard to the existing curve were asked.

a) What is the time scale on the volt-time curve of the transformer in Figure 3 of C62.2. For example, the peak of the full wave is plotted at 8 μsec, and the peak of the switching impulse is plotted at 300 μsec. Do these times represent the length of time above 90% of the peak voltage?

b) What are the assumptions limiting the use of the curve, e.g. are the applied voltages aperiodic?

c) Does the transformer insulation withstand curve represent the minimum voltage envelope for all modes of failure within the transformer structure, e.g. we are considering the transformer as a black box.

It was generally agreed that the insulation strength of the transformer to the system over the time spectrum shown in Fig. 3 of C62.2 can be represented by extending the curve from the BIL point at

8 μsec to the BSL point at 300 μsec by a smooth curve. An analytic expression is to be developed after closer examination of the volt-time characteristic plotted in log-log and semi-log format.

For the curve to be meaningful, a clear definition of the time scale must be established. It was also suggested that the assumptions made in establishing this curve should be noted on the curve.

The Chair will draft a note to this effect and have it circulated within the task force by the end of October. It is our goal to have an agreed-upon curve with limiting comments for the Working Group consideration by the Spring meeting.

There was no old or new business. The meeting was adjourned at 11:45.

7.12.1.1.2 Task Force of Revision of Induced Test - M. Perkins, Chair

The task force met on September 26th at 8:00 AM with 16 members and 24 guests present. Four people requested membership in the task force. After the usual introduction of members, the minutes of the previous meeting in Dallas were approved as written.

The chair then reviewed the results of a survey of the task force membership on the induced test acceptance criterion. (A summary of the results of the survey was included with the minutes from the task force.) The most favored option included:

a) A 7200 cycle enhancement time

b) The reference level for partial discharge after the enhancement

c) A limit of 500 pC

d) A maximum sustained increase of 150 pC during the hour

e) No more than a 50 pC increase in the last 20 minutes.

Members had additional comments on the survey including the increasing trends in partial discharge levels, limiting increases in the last 20 minutes of the test, measuring partial discharge levels at 120% voltage, and running the pumps on EHV transformers.

The task force then discussed a variety of issues including:

a) Running the pumps during the induced test

b) Surveying manufactures regarding equipment used and test methods.

c) Using the Hydro-Quebec specification and George Vaillancourt's definition of pd activity

d) The IEC draft on partial discharge measurement

e) The scope of the task force and what direction we should be going.

It was agreed to form another small sub-group consisting of Mssrs. Perkins, Poulin, Adolphson, Vaillancourt, and Tuli, to begin preparation of a draft document revising the induced test.

The task force adjourned at 9:15 AM.

7.12.1.1.3 Results of a ballot on Switching Surge Tests for EHV Transformers.

A proposition was made to revise Table 17 of C57.12.00 in order to make the Switching Surge Test a routine test for EHV transformers. This was the object of a ballot during the summer of 1994. The results of the ballot were as follows:

Ballots sent out:	111
Approved:	68
Approved with comments:	5
Not approved:	1
Abstain:	1
Total return:	77/111 = 69%

The negative vote was briefly discussed at the meeting and was resolved. The comments received will be incorporated into the revision and a new ballot will take place before the next meeting.

7.12.1.1.4 Results of the survey on proposed changes to the impulse test procedure on EHV transformers.

Three subjects were covered in this survey. They were "The implementation of a special termination lightning test", "The implementation of a fast front switching impulse test", and "Implementation of more definitive requirements on permissible LI wave shapes and correction factors for cases where proper LI wave shapes are not achieved".

The results of the survey were presented at the meeting. The conclusions were that there was very little support for the first two propositions, while the third subject received mostly favorable responses. The people who have proposed these changes have agreed to prepare a proposition for a revision of the test code for the next meeting.

There was no other business. The Working Group adjourned at 5:00 P.M.

7.12.1.2 Working Group on Revision of Dielectric Tests for Distribution Transformers - J. Rosetti, Chair

The working group met at 10:55 AM on September 26th with 11 members and five guests present. The introductions were made and the minutes of the Dallas meeting were approved.

Al Maguire reported on the SPD meeting held in Pittsburgh in September. Phil Barker has been appointed as chair of TF23, Distribution Transformer Protection, within SPD WG 3.4.14. Al suggested that the WG submit to Phil what we as a group or as individuals would like to see in TF 23's Distribution Transformer Protection Guide. Al recommended that we supply the details that we would like to see in the protection guide. John Rosetti will send copies of a proposed outline that was presented at our WG's March 21st meeting in Dallas. A copy of the WG's TF report on Secondary (Low-side) Surges in Distribution Transformers will be sent as well. Al reminded the WG that we would have an opportunity to review TF 23's Distribution Transformer Protection draft. The PAR assigned for this guide within our WG will be terminated as this is covered by SPD's PAR under their WG 3.4.14.

Don Ballard reported on the TF on writing a Guide for Routine Impulse Testing of Distribution Transformers. The TF was convened at 8:00 AM on September 26th with five members and 12 guests in attendance. After introductions and approval of the minutes, the first order of business was a discussion of the first draft of the guide. Sections one through five were reviewed during the TF meeting. The meeting was concluded at 9:20. Further discussion of draft 1 followed during the working group session at 10:55.

Under new business a request was made by Don Ballard for a revision of Section 10.4 in C57.12.90. Section C57.12.90 does not currently quantify what is meant by high-voltage windings.

In the revision. high-voltage windings would mean windings above 600 volts. Also discussed was a revision to remove the requirement for connection of H2 and X2 bushings to the tank. The present practice decreases the fault detection sensitivity. John Rosetti indicated that he would ballot the WG on this revision before the next meeting. This would be done under the PAR that is being issued for the continuous revision of C57.12.90.

The working group adjourned at 12:10 PM.

7.12.1.3 Working Group on Acoustic Location of Partial Discharges - E. Howells, Chair

The working group convened at 10:55 AM on September 26th with 7 members and twenty guests present. Following the usual introductions, the minutes of the Dallas meeting were approved.

The next order of business was the "Trial-use Guide for the Acoustic Location of Partial Discharges." At the Dallas meeting the subcommittee had approved it being balloted at both the working group and subcommittee levels. However, because in the interim the chair had been out of the country, it was late being circulated. In all 85 ballots were mailed out and only 7 were returned by the meeting. It was requested that those who received the ballots after the meeting give them urgent attention so that any negative comments could be resolved before the next meeting.

Next, Jack Harley commented on the listing of field installations of locating systems which had been presented at the last meeting. Several new systems had since been installed. However, data was still being obtained so it was too early to comment on them at this time.

Although not germane to the current work in the "Location" guide, the group had requested a similar listing of single channel "Detection" instruments. Therefore at this meeting Ed Howells presented a list of 167 currently in use. This identified not only the number of instruments known to exist but also the area in which they were located and type of users involved. It was also pointed out that many more instruments were in existence but because many manufacturers were involved, it was difficult to determine their actual number and whereabouts.

It was again reiterated that both lists should be updated as more information became available. Under "Old Business" the group was informed that the Standards Committee had decided that the "Trial-use Guide for the Acoustic Detection of Partial Discharges" had been in the system so long that it was necessary to submit a new PAR to get it back on track. Ed Howells had been in contact with George Vaillancourt and they would work together to get this resolved as quickly as possible.

There being no other business, the meeting was adjourned at 11:45 A.M..

7.12.2 Old Business

7.12.2.1 LV Wiring and CT Circuit Test Requirements

Subhash Tuli presented his report on secondary control circuit or LV wiring and CT circuit test requirements on all classes of transformers, which he had agreed to investigate at the Dallas meeting.

Subhash referenced the following documents: C37.52 - 1974, C57.20.2-1987, C57.13-1978, C57.13.2-1991, C37.55-1978, and C37.90-1978.

He presented three proposals for our consideration, which will be balloted by the subcommittee prior to the next meeting.

Proposal #1 for IEEE STD C57.12.00:
Dielectric withstand test for low voltage control wiring and instrument transformer secondary circuits for class I and class II power transformers.

All low voltage control wiring circuits including secondary circuits of instrument transformers when terminated in the control box of a fully assembled transformer shall be tested for low frequency withstand voltage tests for one minute.

Description of tests:

a) Low frequency withstand voltage tests shall be made in accordance with ANSI/IEEE STD 4-1978 unless otherwise specified.

b) The voltage shall be applied for one minute duration.

c) The frequency of the test voltage shall be the same frequency for which the transformer is designed, ±20%.

d) The voltage shall be alternating, single or multiple phases.

e) The test shall be made under dry conditions at the site ambient temperature, pressure, and humidity prevailing at the time of test. No corrections shall be made to test voltages.

f) All control circuits shall be judged to have passed the test if it has withstood the required level of test voltage for one minute. (Any audible noises encountered during the course of the test duration are not necessarily indicative of a failure.)

g) 1500 volts, AC voltage shall be applied to all control winding circuits, excluding current transformer secondary circuits.
Notes:
1) All solid state and microprocessor based devices shall be excluded from the test circuit.
2) All three phase undervoltage relays and withdrawal type devices shall be removed from the test circuit.

h) 2500 volts, AC voltage shall be applied to the entire current transformer secondary circuits at the location of each tap(s) termination in the control box.

Proposal #2 for IEEE STD C57.12.90 - Test Procedure for withstand test for low voltage control wiring circuit and current transformer secondary circuit.

The control box ground shall be removed from the control box and specified AC voltage will be applied across respective control circuit wiring under test. Ground the control box and apply tine to ground voltage as specified in IEEE STD C57.12.00.

Proposal #3 for C57.12.00-1993 Table #17 on pages 42 and 43

In this table items listed under tests need to be rearranged as most items are out of sequence for normal routine production and design tests. The sequence listed in the table is misunderstood by several utilities, which can be eliminated by changing the order of tests.

7.12.3 New Business

7.12.3.1 Interpretation of Standards C57.12.90-1993 Item 10.4

A letter was received from Trevor Lusiuk requesting clarification of the impulse testing of distribution transformers as described in clauses 10.4.2.1 and 10.4.2.2 which imply that they are routine tests. John Rosetti replied that it was intended to be a routine test, but since not everyone could perform the test it needs to be worked out between the manufacturer and user if the tests cannot be performed. The question is still open.

The Subcommittee meeting adjourned at 12:00 noon.

Respectfully submitted,
James B. Templeton

STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE — DATE: 10/14/94

ATTACHMENT 4

SUBCOMMITTEE: DIELECTRIC TESTS / CHAIRPERSON: J. B. TEMPLETON / PHONE: (317)289-1211 / FAX: (317)286-9352

STANDARD NO. / PROJECT NO.	TITLE OF DOCUMENT / WORKING GROUP	WG CHAIRPERSON	TF CHAIRPERSON	COMMITTEES REQUESTING COORDINATION / PUB_DATE	PAR_DATE	REV_DUE_YEAR	WG_PHONE	LATEST STATUS / COMMENTS
C57.12.90	REVISION OF THE INDUCED TEST							DISCUSSING SURVEY RESULTS
PC57.12.90d	REVISION OF DIELECTRIC TESTS	POULIN B.	M. PERKINS	/ /	09/28/90	0	(408)957-8326	NEW WORKING GP TO WORK ON THIS
C57.21	REQUIREMENTS,TERMINOLOGY AND TEST CODE FOR SH. REACTORS OVER 500kVA			NONE				COMPLETE
PC57.21a	DIELC TESTS OF SHUNT REACTORS	KENNEDY W. N.		04/02/91	12/11/86	1995	(317)286-9387	ANSI APPROVED 08/09/91
C57.98	IEEE GUIDE FOR TRANSFORMER IMPULSE TESTS			NONE				REVISION APP. BY SB 12/02/93
PC57.98	REVISION OF DIELECTRIC TESTS	POULIN B.	R. E. MINKWITZ, SR.	06/01/86	02/01/86	1992	(408)957-8326	WAITING ANSI APPROVAL
C57.98	GUIDE FOR PERFORMING ROUTINE LIGHTNING IMPULSE TESTS ON DIST.TRANSFO			T&D	PSIM PSC	ASC 62	EM	CLARIFY PAR BUSINESS
PC57.98a	REV. DIELECTIC TESTS DIST TR	ROSSETTI J.	D. E. BALLARD	/ /	04/30/91	0	(901)528-4743	SUPPLEMENT TO C57.98
C57.113	GUIDE FOR PARTIAL DISCHARGE MEASUREMENT IN LIQUID-FILLED POWER TRANSFORMERS AND SHUNT REACTOR							PUBLISHED AS FULL-USE 1992
P545	P. D. TESTS FOR TRANSFORMERS	HOWELLS E.		12/05/91	09/25/91	1996	(414)835-1500	
C57.127	GUIDE FOR THE DETECTION OF ACOUSTIC EMISSIONS FROM PARTIAL DISCHARGES IN OIL-IMMERSED POWER TRANSFORMERS			T&D	ED&PG CIGRE	IEC		REBALLOT MAIN COMMITTEE
PC57.127	P. D. TESTS FOR TRANSFORMERS	HOWELLS E.		/ /	03/10/88	0	(414)835-1500	WAITING FOR BALLOT
IEEE1350	GUIDE FOR PROTECTION OF DISTRIBUTION TRANSFORMERS WITH EMPHASIS ON SECONDARY (LOW VOLTAGE SIDE) SURGES			SPD	T&D IC			CONTINUE WORK IN SPD
P1350	REV. DIELECTRIC TESTS DIST TR	ROSSETTI J.	W. A. MAGUIRE	/ /	03/17/93	0	(901)528-4743	JOINT PROJECT WITH SPD
NEW	GUIDE FOR THE LOCATION OF ACOUSTIC EMISSIONS FROM PARTIAL DISCHARGES IN OIL-IMMERSED POWER TRANSFORMERS							BALLOTTING WORKING GROUP
NO PAR YET	P. D. TESTS FOR TRANSFORMERS	HOWELLS E.		/ /	/ /	0	(414)835-1500	SUBMIT PAR AS SOON AS POSSIBLE

COORDINATION ACTIVITY OF DIELECTRIC TESTS SUBCOMMITTEE AS PER: 10/14/94

PROJECT NO. / DATE	TITLE / PES COM.	CONTACT IN PES COM.	CONTACT PHONE	COORDINATOR TRANS. COM.	COMMENT OR STATUS OF DOCUMENT / COORD. PHONE
P 4 02/02/89	STANDARD TECHNIQUES FOR HIGH-VOLTAGE TESTING PSIM	TERRY McCOMB	613-990-5826	G. VAILLANCOURT	BALLOTING IN PSIM 514-652-8515
P1122 12/03/92	DIGITAL RECORDERS FOR MEASUREMENTS IN HIGH VOLTAGE IMPULSE TESTS PSIM	T. R. McCOMB	613-990-5826	BERTRAND POULIN	APPROVED BY SB 03/17/94 408-957-8326
P1223 08/17/89	POWER SYSTEM DIGITAL TESTING TECHNIQUES PSIM	T. R. McCOMB	613-990-5826	R. MINKMITZ, SR.	617-828-3241
PC37.107 12/28/85	STANDARD FOR DIGITAL PROTECTION SYSTEM DESIGN PSR	STIG L. NILSSON	415-855-2314	JIM HARLOW	813-535-3408
C62.62 03/21/91	PERFORMANCE CHARACTERISTICS FOR SURGE PROTECTIVE DEVICES CONNECTED TO LOW VOLTAGE AC POWER CIRCUITS SPD	LEWIS DOUGLAS SWEENEY	602-834-9372	MAHESH P. SAMPAT	REPLACE P1038 704-462-3226
PC62.11 06/14/94	STANDARD FOR METAL-OXIDE SURGE ARRESTERS FOR AC POWER CIRCUITS SPD	R. M. SIMPSON	919-836-7059	W. A. MAGUIRE	NEW PAR 301-377-4273
PC62.22 12/02/93	GUIDE FOR APPLICATION OF METAL OXIDE SURGE ARRESTERS FOR AC SYSTEMS SPD	J. WOODWORTH	716-375-7270	ROBERT DEGENEFF	WILL INCLUDE DIST. TRANSFORMER 518-276-6367
PC62.42 07/18/94	GUIDE FOR THE APPLICATION OF LOW-VOLTAGE SURGE PROTECTIVE DEVICES SPD	R. DAVIDSON JR.		MAHESH P. SAMPAT	REVISED PAR 704-462-3226

EPRI
Electric Power
Research Institute

Leadership in Science and Technology

MEMORANDUM

September 23, 1994

TO: Mr. Wallace B. Binder, Jr.
Secretary, IEEE Transformers Committee
Transmission & Distribution Engrg, Dept.
Ohio Edison Co.
76 South Main Street
Akron, Ohio 44308

FROM: Stan Lindgren, Project Manager

SUBJECT: **EPRI LIAISON REPORT**

The following report is for inclusion in your minutes for the September 28, 1994, meeting.

1. EHV Converter Transformer:

   - Test results confirmed 25% or greater major insulation size reduction can be attained with some further work.
   - Final report will be published pending patent filing actions.

2. Advanced Power Transformer:

   - Reduced total owning cost has been demonstrated.
   - A 47 MVA three phase core form prototype was built and successfully short circuit tested March, 1991 delivered to HL&P and is in service. An IEEE paper, 94 SM 414-3 PRD was presented at the IEEE/PES 1994 Summer Meeting in San Francisco.
   - Development of shell form insulation, winding and physical models continues. 1425 BIL dielectric models have been tested successfully. A 25MVA single phase, 161 kV model has been built. Test evaluation including short circuit, is in process.

3. Static Electrification in Power Transformers:

   - This is the suspected failure mechanism in over 24 core form and shell form FOA transformers worldwide. Recent failures involve 20 year old transformers.
   - Work has focused on the effects of temperature and moisture transients. Tests on representative transformer cooling components have been completed. A project continues to monitor a large FOA transformer in the field. Data is being collected and monitored at a remote location that shows increased static electrification activity at low oil temperatures with pumps running.
   - Progress is being made in understanding the effects of BTA oil additive on static electrification through flow model experiments.

4. Bubble Evolution in Overloaded Transformers:

   - Very rapid load changes can cause bubble formulation under some conditions and reduce 60 Hz and impulse dielectric strength. This has been demonstrated in models with rapid/high O.L.

   - A computer program covering bubble evolution plus the ANSI Loading Guide formulas has been developed as an EPRIGEMS, AP-102649, available as of July, 1993. Some software problems were found by users. Corrections have been made, and a new version (PTLOAD 4.1) is now available.

   - Additional work is being initiated to experimentally study moisture dynamics associated with rapid overloads and cooldown cycles plus detect inception of partial discharges caused by bubble evolution.

5. High Voltage Instrument Transformers

   EPRI sponsored a workshop 9/90 to provide a forum to compare and categorize failure information, failure modes and potential mitigation measures. This was an outgrowth of the roundtable in Washington DC 4/88. Proceedings, TR 100205, are published. A Project was completed to study fast disconnect switching transient effects on HVCTs. Mathematical modeling was checked experimentally through laboratory tests and switching tests in a 500 kV substation with very high speed instrumentation. Effects of switching resistors during disconnect switching has been studied and found to reduce bus transients and stresses by up to 80%. A final report is in process.

6. Power Transformer Tank Rupture - Risk Assessment and Mitigation

   This project has been completed except for final report which will be published pending patent applications. Over 20 well documented cases have been collected from which several were selected for detailed study. A final report is in process pending patent actions.

7. Geomagnetic Induced Currents (GIC)

   EPRI has three projects.

   - A feasibility demonstration has been completed for detection of transformer core saturation at twenty-five locations reporting to a central location. Useful data was collected from several GIC events. A dozen or so locations will continue on a routine monitoring basis.

   - Two transformer neutral GIC blocking devices were installed in 1991 and preliminary field trials were performed with good results in June, 1991. The systems were moved to active transmission line locations and have bypassed successfully during the past one and one half years.

   - A project to evaluate the response of protective relaying systems to GIC has been completed. A final report is in process.

8. Thermal Models for Real-Time Monitoring

   This project involves all transmission components including power transformers regarding software development and a field test involving two substations on a utility system. The field

test has been completed. A final report is in process. An IEEE paper, 94 SM 473-9 PWRD, was presented at the IEEE/PES 1994 Summer Meeting in San Francisco.

9. Microelectronic Fault Gas Analyzer

This project is a continuation of earlier EPRI efforts to develop an on-line low cost gas analyzer that were abandoned because of baseline drift of the sensors. The new project utilizes a different type of sensor to monitor multiple gases. A field demonstration program is underway with 12 prototypes in service at this time.

10. Furaldehyde in Transformer Oil

A new project has been initiated to develop a correlation between furaldehydes in oil samples with degree of polymerization found in paper insulation samples taken from a significant number of transformers in service.

11. Transformer Expert System

A new project has been initiated to determine the feasibility of capturing the knowledge of transformer experts and making it useable as a tool for evaluation of transformer design questions, existing condition assessment, problem diagnosis, and identification of maintenance needs.

cc: Jim Harlow, Beckwith
Mark Wilhelm

SRL:sj:9862.M.BinderRev.3/sj

8.2 Standards Coordinating Committee No. 4 - P. A. Payne

No report.

8.3 CIGRE SC12 - W. N. Kennedy

IEEE

POWER ENGINEERING SOCIETY
TRANSFORMERS COMMITTEE

CIGRE STUDY COMMITTEE 12 (TRANSFORMERS)
LIAISON REPORT TO IEEE TRANSFORMERS COMMITTEE

Sept. 28, 1994

1. Introduction

CIGRE held its 35th General Session August 28th through September 3rd in Paris, France. During the week the working groups and task forces of Study Committee 12 (Transformers) held individual meetings, while the general meeting for Transformers was held on Sept. 2nd.

Three subjects were discussed at the SC12 meeting: installation of transformers and reactors on site, repair and refurbishment of transformers and reactors, and dielectric testing of EHV transformers according to IEC 76-3. Copies of the special report (12.00) which included the discussion questions were sent to all members of the IEEE Transformers Committee in a special mailing by John Matthews in August, and we received several excellent contributions which were presented at the general meeting. Highlights of the discussion are summarized in the following sections, while a list of the papers that were distributed at the meeting is attached to this report.

In addition, there was a panel discussion on "Material Reliability for Network Equipment" with participants from the transformers, rotating machines, switching equipment, insulating materials, insulated cables and overhead lines study committees.

2. Installation of transformers and reactors on site

Mr. Lindroth from ABB Ludvika discussed a piezoelectric impact recorder whose sensor is mounted on the core clamps.

Site assembly of transformers has been tried in the past in several countries, but interest remains high only in Japan at present. Mr. Muira from Japan gave a most interesting presentation discussion the relative costs that concluded that a site assembled three-phase transformer can be less

expensive than three single-phase units assembled in the factory. (The cost of land is a critical component in the analysis - the smaller footprint of the site-assembled three-phase unit compared to the three single-phase units is important.) The use of separate buildings erected over the transformer site is essential to maintain cleanliness and control humidity.

Although many manufacturers don't recommend storing transformers filled with dry air for more than six months or so, it was generally agreed that they can be stored almost indefinitely provided that they were thoroughly dried and oil-impregnated at the factory.

Processing of transformers on site received considerable attention in the discussion. A video was shown by Mr. Boisdon from France which showed microbubbles produced by carbon particles when they touched bare electrodes in a Rogowski gap. There was general agreement that particle count was extremely important in HVDC converter transformers, but several individuals commented that oil breakdown strength was more significant for conventional units.

3. Repair and refurbishment of transformers and reactors

Governing factors in the decision to repair on site or ship back to a factory include:

- time factor (cost of down time, seasonal load demands, etc.)
- transport difficulties/cost of transport
- risk
- condition of transformer insulation (as determined by diagnostic testing)
- factory availability
- cost of repair on site or in factory

Several examples were given of truly heroic repairs to transformers on site, including ones by Mr. Ravot from ABB Secheron and Mr. Åström of ABB Brazil. In Mr. Åström's example, it would have taken 90 days simply to ship the transformers back to the factory. The on-site repairs were accomplished in 105 days including all processing, drying, and oil treatment. The work involved the replacement of 15 coils, the series reactors, and all insulation materials.

Mr. Harley from the United States presented an update on monitoring equipment including a description of the new

8.3 CIGRE SC12 - W. N. Kennedy

"Datawatch Hotspotter" system which is operating on 70 transformers and has prevented at least 12 failures in LTC mechanisms.

4. Dielectric testing of EHV transformers according to IEC 76-3.

Dr. Stein presented the keynote address on this topic. Briefly, IEC 76-3 allows two induced tests for transformers $\geq$ 300 kV operating voltage: a short-time (15 to 20 second) induced test coordinated with the basic insulation level or a long duration (35 minute) induced test with partial discharge measurements. Two combinations are possible with the long-term induced test: $1.5Um/\sqrt{3}$ with $\leq$ 500 pC or $1.3Um/\sqrt{3}$ with $\leq$ 300 pC.

Both long-term options are preceded by 5 minutes at the test voltage defined above and a 5 second spike at $1.73Um/\sqrt{3}$.

Both short- and long-time tests require full-wave impulse tests with optional chopped-wave tests, while the long term test also requires a switching impulse test.

The discussion showed that method 1 is never used in its pure form for transformers $\geq$ 300 kV. If the short-time induced test is used, an additional PD test and/or switching impulse are almost always included. Many countries use method 2 exactly as specified in IEC 76-3, while others use a combination of methods 1 and 2. There was general agreement that the PD test should be extended into voltage levels below 300 kV, perhaps as low as 110 kV. There was little support for special tests to examine resonant overvoltages or for very fast transients.

5. Working Group Activities

Summaries of the SC12 working groups were included in the liaison report for the March 23rd Transformer Committee meeting minutes. Updates since our last meeting are:

12/14.10 (HVDC): Draft documents have been prepared on sound levels of HVDC equipment, a simplified loss calculation technique, and impedance tolerance.

12/15.13 (Static Electrification): The revolving pressboard disk test cell has encountered difficulties in achieving

reproducible results and alternative techniques will be investigated. The Working Group is planning a workshop/ meeting in Milwaukee from Sept. 28th through Sept. 30th..

12.14 (Reliability): A new statistical analysis package is available and interested parties are strongly encouraged to submit data!

12.16 (Instrument Transformers): This working group held its first meeting in Paris. It will develop procedures to examine the design, tests, modes of failure, and maintenance and life management for oil/paper, SF6, and resin insulated instrument transformers.

12.XX (Particles in Oil): Mr. Aubin will be the covenor of this working group which is currently being formed.

12.YY (Life Management): Planned activities for this working group include general knowledge, diagnostics and monitoring techniques, and operations on transformers.

6. Next Meeting

The next meeting will be a colloquium for SC12 (Transformers) to be held in June, 1995. Topics that will be discussed include: workshops on bushings, LTC and other accessories, HVDC converter transformers, and a general discussion on future work.

Respectfully submitted,

Bill Kennedy

William Kennedy
US Representative to SC12 (Transformers)

"ieecig94"

8.3 CIGRE SC12 - W. N. Kennedy

LIST OF CIGRE TRANSFORMER PAPERS FOR 1994 GENERAL MEETING

General

12-00 Special Report for Group 12 - G. Breen (Ireland) and B. Corderoy (Australia)

Preferential Subject 1

12-101 On-site conditioning of transformers: its control and impact on the dielectric strength - C. Boisdon, M. Carballeira, P. Guuinic, L. Latil, J. Poittevin (France)

12-102 Improved measures to solve the transportation problems of large power transformers - T. Kawamura, H. Fujita, M. Ichikawa, Y. Miura (Japan)

12-103 Installation of Power Transformers on site - D.J. Allan, B. Corderoy, R.P. DeLhorbe, L. Savio, V. Sokolov on behalf of Study Committee 12

12-104 Transportation problems of large power transformers in conjunction with design characteristics and activities related to on site installation and setting in service - A. Babare, P.L. Caberlotto, G. Cannavale, G. Caprio, S. Crepaz, O. Monzani (Italy)

12-105 Installation of power transformers in underground substations of the Central London area - M.P. Saravolac, R. M. Baker, J.W.H. Roberts, P.G. Rampton (United Kingdom)

Preferential Subject 2

12-201 Experience of fault detecting, repairing and testing of EHV transformers and shunt reactors on site - S.D. Lizunov, A.K. Lokhanin, T.I. Morozova (Russia), V.V. Gurin, V.V. Sokolov, V.M. Tchornogotsky (Ukraine)

12-202 Repair on site ofEHV transformers in the Polish grid - T. Domzalski, M. Kazmierski, M. Kozlowski, W. Olech (Poland)

12-203 Repair and refurbishment of power transformers - A Finnish view on the approaches and experiences - J. Elovaara, K. Heinonen, T. Ojanen, P. Salonen, H. Nordman, T. Perala (Finland)

12-204 AEP Experiences with repair and refurbishment of transformers and reactors - J.A. Fleeman, J.H. Provanzana, J.M. Bednar (United States)

12-205 On site determination of the condition of on-load tap changer contacts if a hot spot has been indicated by gas-in-oil analysis in power transformers - A. Kramer, H. Maier, F. Flottmeyer (Germany)

12-206 A DC expert system (RVM) for checking the refurbishment efficiency of high voltage oil-paper insulating system using polarization spectrum analysis in range of long-time constants - G. Csepes, I. Hamos, I. Kispal, J. Schmidt, A. Bognar (Hungary)

12-207 Repair of large power transformers: experiences developed in Italy - A. Babare, F. Cannata, M. Borsani, P.L. Caberlotto, G. Cannavale, C.M. Arturi, M. Ubaldini (Italy)

9.0 New Business

No new business was brought forward.

The meeting was adjourned at 12:02 pm.

Respectfully submitted,

John W. Matthews
Secretary

STATUS REPORT ON STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE
ATTACHMENT 1

DATE: 10/14/94
PAGE NO: 1 OF 11

STANDARD NO / PROJECT NO	TITLE OF DOCUMENT / SUBCOMMITTEE	SC CHAIRPERSON	WG CHAIRPERSON	COMMITTEES REQUESTING COORDINATION: PUB_DATE	PAR_DATE	REV_DUE_YEAR	SC_CH_PHONE	LATEST STATUS / COMMENTS
C57.12.00	GENERAL REQUIREMENTS FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS							APPROVED BY ANSI 08/04/93
VARIOUS	STANDARDS	G. VAILLANCOURT	BORST J. D.	06/16/93	/ /	1998	(514)652-8515	NEW WORKING GROUP FORMED
C57.12.00	DEFINITION OF THERMAL DUPLICATE			EM	IAS			
PC57.12.001	INSULATION LIFE	L. W. PIERCE	GRUBB R. L.	/ /	05/31/90	1997	(706)291-3166	
C57.12.00	GENERAL REQUIREMENTS FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS							WORKING ON COOLING CLASS, NP
PC57.12.00m	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	KRAUSE P.	/ /	/ /	0	(205)877-7740	TABLE 19 WILL BE REMOVED
C57.12.01	GENERAL REQUIREMENTS FOR DRY-TYPE DIST. AND POWER TR INCL THOSE WITH SOLID CAST &/or RESIN-ENCAPSULATED WINDINGS							ONE YEAR EXTENSION REQUESTED
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON	JONATTI A.	02/02/89	/ /	1994	(919)856-2420	APP. BY SB 02/02/89
C57.12.10	TRANSFORMERS 230kV AND BELOW -8333/10417kVA 1 PH, -100000 kVA 3 PH w/o LTC, -100000kVA w/ LTC - SAFETY REQUIREMENTS							TRANSFERRED TO IEEE
ANSI	STANDARDS	G. VAILLANCOURT		06/04/87	/ /	1993	(514)652-8515	NEEDS A HOME, DUE FOR REAF.
C57.12.11	GUIDE FOR INSTALLATION OF OIL-IMMERSED TRANSFORMERS (10MVA & LARGER, 69-287kV RATING)							TO BE REPLACED BY C57.93
PC57.93	WEST COAST	DAVID BRUCKER	GILLIES D. A.	05/09/80	/ /	1992	(415)692-4431	LIFE EXTENSION TO 12/92
C57.12.12	GUIDE FOR INSTALLATION OF OIL-IMMERSED TRANSFORMERS 345kV AND ABOVE							TO BE REPLACED BY C57.93
PC57.93	WEST COAST	DAVID BRUCKER	GILLIES D. A.	05/09/80	/ /	1992	(415)692-4431	LIFE EXTENSION TO 12/92
C57.12.13	CONFORMANCE REQUIREMENTS FOR LIQUID-FILLED TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS							ASSIGN TO SUBCOMMITTEE
ANSI	STANDARDS	G. VAILLANCOURT		09/02/81	/ /	1987	(514)652-8515	NEMA STANDARD
C57.12.20	OVERHEAD-TYPE DISTRIBUTION TRANSFORMERS, 500 kVA AND SMALLER: H V 34500 VOLTS AND BELOW, L V 7970/13800Y & BELOW	T&D	IAS/REP SCC14					PAR APPROVED BY NESCOM
PC57.12.20	DISTRIBUTION TRANSFORMERS	KEN HANUS	ANDERSON G. W.	01/11/88	12/05/91	1993	(817)882-6020	BALLOTING SUBCOMM.

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C57.12.21	STANDARD REQUIREMENTS FOR PAD-MOUNTED, COMPARTMENTAL-TYPE, SELF-COOLED, SINGLE-PHASE DIST TRANSFORMERS WITH HV BUSHINGS			T&D	IAS/REP			APPROVED BY ANSI
PC57.12.21	DISTRIBUTION TRANSFORMERS	KEN HANUS	GHAFOURIAN A.	10/22/79	06/27/91	1965	(817)882-6020	COPYRIGHT NOT RELEASED
C57.12.22	PAD-MOUNTED,COMPARTMENTAL-TYPE SELF-COOLED,3-PHASE DIST. TR WITH HV BUSHINGS,2500kVA AND SMALLER:...REQUIREMENTS.			T&D	IAS/REP	IAS/PSE		AWAITING ANSI APPROVAL
PC57.12.22	DISTRIBUTION TRANSFORMERS	KEN HANUS	HANUS K.	05/10/89	06/27/91	1994	(817)882-6020	WILL HAVE NEW NUMBER
C57.12.23	UNDERGROUND-TYPE,SELF-COOLED, 1-PHASE DISTRIBUTION TR WITH SEPERABLE INSULATED HV CONNECT HV 24940GrdY..LV,240..;167kVA.			T&D	IC	IAS/REP	IAS/PSE	ANSI APPROVED 02/18/94
PC57.12.23	DISTRIBUTION TRANSFORMERS	KEN HANUS	PAIVA G.	09/19/85	06/27/91	1996	(817)882-6020	TO BE PUBLISHED BY ANSI
C57.12.24	UNDERGROUND-TYPE 3-PHASE DIST- RIBUTION TRANSFORMERS,2500kVA AND SMALLER: HV,34500GrdY..& BELOW,LV,480 V AND BELOW			T&D	IC	IAS/REP	IAC/PSE	WILL BE PUBLISHED BY NEMA
PC57.12.24	UG TR & NETWORK PROTECTORS	PAUL ORSHEK	NIEMANN C.	05/10/88	06/27/91	1993	(201)430-7743	ANSI APPROVED 05/23/94
C57.12.25	REQUIREMENTS FOR PAD-MOUNTED COMP-TYPE,SELF-COOLED,1-PHASE DISTRIBUTION TR W/SEP INS HV CONN,HV 34500GrdY...167kVA...			T&D	IC	IAS/REP	IAS/PSE	WORKING ON DRAFT 1
PC57.12.25	DISTRIBUTION TRANSFORMERS	KEN HANUS	MOHESKY N.	05/11/90	06/27/91	1995	(817)882-6020	COPYRIGHT NOT RELEASED
C57.12.26	PAD-MOUNTED COMPARTMENTAL-TYPE SELF-COOLED,3-PHASE DIST TR for USE W/ SEPERABLE INSULATED HV CONN.,HV 34500GrdY..2500kVA			T&D	IC	IAS/REP	IAS/PSE SCC14	WILL HAVE NEW NUMBER
PC57.12.26	DISTRIBUTION TRANSFORMERS	KEN HANUS	PEARSON L. C.	06/17/92	12/05/91	1997	(817)882-6020	APPROVED BY ANSI
C57.12.28	PAD-MOUNTED EQUIPMENT - ENCLOSURE INTEGRITY							EXTENSION TO BE REQUESTED
ANSI	DISTRIBUTION TRANSFORMERS	KEN HANUS	MARTIN J.	06/24/87	/ /	1994	(817)882-6020	BEING BALLOTED IN WG
C57.12.29	PAD-MOUNTED EQUIPMENT - ENCLOSURE INTEGRITY IN COASTAL ENVIRONMENTS							PUBLISHED IN 1992
ANSI	DISTRIBUTION TRANSFORMERS	KEN HANUS	MARTIN J.	/ /	/ /	1996	(817)882-6020	NOT TRANSFORMERS COMM.
C57.12.30	SUBMERSIBLE EQUIPMENT - ENCLOSURE INTEGRITY							TO BE BALLOTED
ANSI	DISTRIBUTION TRANSFORMERS	KEN HANUS	MARTIN J.	/ /	/ /	1994	(817)882-6020	NUMBER TO BE CHANGED
C57.12.31	COATING STANDARD FOR POLE MOUNTED TRANSFORMERS							PAR TO BE SUBMITTED
ANSI	DISTRIBUTION TRANSFORMERS	KEN HANUS	MARTIN J.	/ /	/ /	1994	(817)882-6020	EXPECT TO COMPLETE BY 12/94

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C57.12.32								
ANSI	DISTRIBUTION TRANSFORMERS	KEN HANUS		/ /	/ /	0	(817)882-6020	
C57.12.40	REQUIREMENTS FOR SECONDARY NETWORK TRANSFORMERS, SUBWAY & VAULT TYPES (LIQUID IMMERSED)			SCC14				REVISION APPR. BY SB 12/02/93
PC57.12.40	UG TR & NETWORK PROTECTORS	PAUL OREHEK	BERTOLINI E. A.	03/19/92	12/05/91	1997	(201)430-7743	WAITING ANSI APPROVAL
C57.12.44	STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS			T&D	SWGR	IAS/REP	IAS/PSE EEI	TO BE PUBLISHED
PC57.12.44	UG TR & NETWORK PROTECTORS	PAUL OREHEK	MULKEY D. H.	/ /	06/17/92	0	(201)430-7743	ANSI APPROVED 05/23/94
C57.12.50	REQ. FOR VENTILATED DRY-TYPE DISTRIBUTION TR, 1-500kVA, 1 PHASE, AND 15-500kVA, 3-PHASE HV 601-34500VOLTS,LV 120-600V							COPYRIGHT NOT RELEASED
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON		06/12/89	/ /	1994	(919)856-2420	BALLOT REAFFIRMATION
C57.12.51	REQ. FOR VENTILATED DRY-TYPE POWER TR, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V, LV 208Y/120 TO 4160 VOLTS							COPYRIGHT NOT RELEASED
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON		06/12/89	/ /	1994	(919)856-2420	BALLOT REAFFIRMATION
C57.12.52	REQ. FOR SEALED DRY-TYPE POWER TRANSFORMERS, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V,LV 208Y/120 TO 4160 VOLTS							COPYRIGHT NOT RELEASED
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON		06/12/89	/ /	1994	(919)856-2420	BALLOT REAFFIRMATION
C57.12.53	REQUIREMENTS FOR DRY-TYPE, UNDERGROUND, SINGLE-PHASE WITH SEPARABLE INSULATED H-V 24940 grdY/14400 V AND <; LV 240/120 V							NEW STANDARD (NO PAR)
ANSI	STANDARDS	G. VAILLANCOURT		/ /	/ /	0	(514)652-8515	NOBODY IS WORKING ON IT
C57.12.54	REQUIREMENTS FOR DRY-TYPE, UNDERGROUND 3 PHASE DISTRIBUTION TRANSFORMERS,2500 kVA OR <, HV 24940 grdY/14400 OR <,LV 480V							NEED TRANSFER TO IEEE
ANSI	STANDARDS	G. VAILLANCOURT		/ /	/ /	0	(514)652-8515	NOT IEEE STANDARD
C57.12.55	CONFORMANCE STANDARD FOR TR- DRY-TYPE TRANSFORMERS USED IN UNIT INSTALLATIONS, INCL. UNIT SUBSTATIONS							COPYRIGHT NOT RELEASED
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON		04/07/86	/ /	1992	(919)856-2420	BALLOT REAFFIRMATION
C57.12.56	TEST PROCEDURE FOR THERMAL EVALUATION OF INSULATION SYST FOR VENTILATED DRY-TYPE POWER & DISTRIBUTION TRANSFORMERS							TO BE PUBLISHED
PC57.12.56	DRY-TYPE TRANSFORMERS	W. PATTERSON	PROVOST R. L.	08/27/84	/ /	1995	(919)856-2420	ANSI APPROVED 01/04/94

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C57.12.57	REQUIREMENTS FOR VENTILATED DRY-TYPE NETWORK TRANSFORMERS 2500kVA AND BELOW, M/HV 34500V AND BELOW,LV 216Y..AND 480Y..			T&D	EEI/T&D SCC14			TO BALLOT D6 IN TC
PC57.12.57	UG TR & NETWORK PROTECTORS	PAUL OREHEK	HUTT B.	03/18/92	12/05/91	1997	(201)430-7743	REAFFIRMED 03/18/92
C57.12.58	GUIDE FOR CONDUCTING TRANSIENT VOLTAGE ANALYSIS OF A DRY-TYPE TRANSFORMER COIL			IEC	IAS			PUBLISHED 1992
P745	DRY-TYPE TRANSFORMERS	W. PATTERSON	KLINE A. D.	06/27/91	06/28/78	1996	(919)856-2420	ANSI APPROVED 10/11/91
C57.12.59	GUIDE FOR DRY-TYPE TRANSFORMER THROUGH-FAULT CURRENT DURATION							BALLOTING REAF. CLOSES 04/18
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON	NONE	01/01/89	09/13/84	1994	(919)856-2420	ANSI APPROVED 08/09/91
C57.12.60	TEST PROCEDURES FOR THERMAL EVALUATION OF INSULATION SYSTEMS FOR SOLID-CAST & RESIN ENCAP POWER & DIST TRANSFORMER			IAS	NEMA	IEC		APPROVED BY SB 10/25/92
PC57.12.60	DRY-TYPE TRANSFORMERS	W. PATTERSON	PROVOST R. L.	10/25/92	08/17/89	1994	(919)856-2420	BEING BALLOTTED IN C57
C57.12.70	TERMINAL MARKINGS AND CONNECTIONS FOR DIST. & POWER TRANSFORMERS							ANSI APPROVED 07/09/93
NONE	STANDARDS	G. VAILLANCOURT	TRAUB T. P.	06/18/92	/ /	1997	(514)652-8515	TO REVISE TERMINOLOGY
C57.12.80	TERMINOLOGY FOR POWER & DISTRIBUTION TRANSFORMERS							WILL START REVISION
NONE	STANDARDS	G. VAILLANCOURT	TRAUB T. P.	05/01/92	/ /	1997	(514)652-8515	APPROVED BY ANSI 12/02/92
C57.12.90	STANDARD TEST CODE FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS & GUIDE FOR SC TESTING OF							NEW WORKING GROUP FORMED
VARIOUS	STANDARDS	G. VAILLANCOURT	SMITH S. D.	03/16/93	/ /	1998	(514)652-8515	APPROVED BY ANSI 08/19/94
C57.12.90	STANDARD TEST CODE FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS							WILL START REVISING SECT. 11
NEW	INSULATION LIFE	L. W. PIERCE	HENRY G.	/ /	/ /	1998	(706)291-3166	
C57.12.90	REVISION OF THE INDUCED TEST							DISCUSSING SURVEY RESULTS
PC57.12.90d	DIELECTRIC TESTS	J. B. TEMPLETON	POULIN B.	/ /	09/28/90	0	(317)289-1211	NEW WORKING GP TO WORK ON THIS
C57.12.90	GUIDE FOR SHORT-CIRCUIT TESTING OF DISTRIBUTION AND POWER TRANSFORMERS							TO REQUEST PAR
PC57.12.90h	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	McQUIN N.	/ /	/ /	0	(205)877-7740	TO SPLIT FROM TEST CODE

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C57.12.90	STANDARD ON SOUND INTENSITY MEASUREMENT							NEW TASK FORCE TO DRAFT STD
PC57.12.90x	AUDIBLE SOUND & VIBRATION	JEENAN PURI		/ /	/ /	0	(704)282-7413	ON MEASURING SOUND INTENSITY
C57.12.91	TEST CODE FOR DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS			SPD EM				SECTIONS 8+9 RECIRCULATED
PC57.12.91	DRY-TYPE TRANSFORMERS	W. PATTERSON	BARNARD D.	11/29/78	06/01/89	1984	(919)856-2420	HARMONIZING WITH C57.12.90-93
C57.13	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS			PSIM PSR SPD				WAITING ANSI APPROVAL
P546	INSTRUMENT TRANSFORMERS	J. E. SMITH		03/30/78	06/14/94	1992	(919)827-2121	REV. PAR APPROVED 06/14/94
C57.13.1	GUIDE FOR FIELD TESTING OF RELAYING CURRENT TRANSFORMERS							APPROVED BY ANSI 12/02/92
PSRC	INSTRUMENT TRANSFORMERS	J. E. SMITH		08/25/87	/ /	1992	(919)827-2121	RELAY COMM. DOCUMENT
C57.13.2	CONFORMANCE TEST PROCEDURES FOR INSTRUMENT TRANSFORMERS							PUBLISHED 1992
NONE	INSTRUMENT TRANSFORMERS	J. E. SMITH		04/16/86	09/26/91	1996	(919)827-2121	RECOGNIZED BY ANSI 12/23/92
C57.13.3	GUIDE FOR THE GROUNDING OF INSTRUMENT TR SECONDARY CICUITS AND CASES							TRANSFER FROM PSRC COMMITTEE
NONE	INSTRUMENT TRANSFORMERS	J. E. SMITH		01/23/87	/ /	1991	(919)827-2121	
C57.13.4	DETECTION OF PARTIAL DISCHARGE AND MEASUREMENT OF APPARENT CHARGE WITHIN INSTRUMENT TRANSFORMERS			T&D				NO PROGRESS LATELY
P832	INSTRUMENT TRANSFORMERS	J. E. SMITH	JONNATTI A. J.	/ /	05/28/80	0	(919)827-2121	
C57.13.5	GUIDE FOR PARTIAL DISCHARGE MEASUREMENT IN INSTRUMENT TRANSFORMERS 69 kV AND ABOVE			SWGR EM				CHANGES NEEDED IN PAR
PC57.13.5	INSTRUMENT TRANSFORMERS	J. E. SMITH	MA J.	/ /	06/14/94	0	(919)827-2121	SUBMIT NEW PAR WITH CHANGES
C57.13.6	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS FOR USE WITH ELECTRONIC REVENUE METERS AND RELAYS			PSIM PSR TD PSC				PAR DISSAPROVED
PC57.13.6	INSTRUMENT TRANSFORMERS	J. E. SMITH	TEN-HAAGEN C. W.	/ /	/ /	0	(919)827-2121	MAKE CHANGES AND RESUBMIT PAR
C57.15	REQUIREMENTS, TERMINOLOGY, & TEST CODE FOR STEP-VOLTAGE AND INDUCTION VOLTAGE REGULATORS							WG REVISING SCOPE
NONE	DISTRIBUTION TRANSFORMERS	KEN HANUS	DIAMANTIS T.	03/18/87	06/19/86	1997	(817)862-6020	APPROVED BY ANSI 12/02/92
C57.16	REQUIREMENTS FOR CURRENT LIMITING REACTORS			NEMA IAS T&D				PREPARING DRAFT 6
PC57.16	DRY-TYPE TRANSFORMERS	W. PATTERSON	DUDLEY R.	09/19/58	03/21/91	1976	(919)856-2420	INCLUDES ONLY DRY TYPE REACTOR

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C57.17	REQUIREMENTS FOR ARC FURNACE TRANSFORMERS							LAST REVISED IN 1986
ANSI	STANDARDS	G. VAILLANCOURT		/ /	/ /	1986	(514)652-8515	ANSI DOCUMENT
C57.18.10	REQUIREMENTS FOR SEMICONDUCTOR RECTIFIER TRANSFORMERS			NONE				
PC57.18.10	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	KENNEDY S. P.	/ /	12/20/81	0	(205)877-7740	PAR HAS BEEN FOUND
C57.19.00	GENERAL REQUIREMENTS AND TEST PROCEDURES FOR OUTDOOR APPARATUS BUSHINGS (IEEE 21)			T&D	PSR	IC	SWGR	PUBLISHED 1992
PC57.19.00	BUSHING	L. B. WAGENAAR	WAGENAAR L. B.	07/23/76	04/01/79	1997	(614)223-2259	APPROVED BY ANSI 03/31/92
C57.19.01	STANDARD PERFORMANCE CHARACTERISTICS AND DIMENSIONS FOR OUTDOOR APPARATUS BUSHINGS (IEEE 24)			SPD	IAS	IC	SWGR	PUBLISHED 1992
PC57.19.01	BUSHING	L. B. WAGENAAR	SINGH PRITPAL	08/05/83	11/01/89	1997	(614)223-2259	APPROVED BY ANSI 03/20/92
C57.19.03	STANDARD REQUIREMENTS, TERMINOLOGY AND TEST CODE FOR BUSHINGS FOR DC APPLICATIONS			SPD	IC	SWGR		WORKING ON DRAFT
PC57.19.03	BUSHING	L. B. WAGENAAR	HEYMAN OLOF	/ /	11/09/89	0	(614)223-2259	SF6 BUSHINGS NOT INCLUDED
C57.19.100	GUIDE FOR APPLICATION OF APPARATUS BUSHINGS.			SWGR	SUB	PSR		REBALLOT OF TC CLOSED AUG 29
P800	BUSHING	L. B. WAGENAAR	ELLIOTT F. E.	/ /	09/27/79	0	(614)223-2259	SUBMIT TO REVCOM
C57.19.101	GUIDE FOR LOADING POWER APPARATUS BUSHINGS							BALLOT TO WITHDRAW
P757	BUSHING	L. B. WAGENAAR	ELLIOTT F. E.	10/20/88	/ /	1997	(614)223-2259	ANSI APPROVED 7/93
C57.21	REQUIREMENTS,TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA			EM	T&D	PSR		COMPLETE
PC57.21	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	McGILL J. W.	04/02/91	06/09/88	1995	(205)877-7740	ANSI APPROVED 08/09/91
C57.21	REQUIREMENTS TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA							COMPLETE
PC57.21	DRY-TYPE TRANSFORMERS	W. PATTERSON	DUDLEY R.	04/02/91	/ /	1995	(919)856-2420	ANSI APPROVED 08/09/91
C57.21	REQUIREMENTS,TERMINOLOGY AND TEST CODE FOR SH. REACTORS OVER 500kVA			NONE				COMPLETE
PC57.21a	DIELECTRIC TESTS	J. B. TEMPLETON	KENNEDY W. N.	04/02/91	12/11/86	1995	(317)289-1211	ANSI APPROVED 08/09/91

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C57.91	GUIDE FOR LOADING MINERAL OIL-IMMERSED TRANSFORMERS			SUB	T&D	PSE		REVISION BALLOTED 01/94
PC57.91	INSULATION LIFE	L. W. PIERCE	PIERCE L.	03/21/91	06/13/85	1997	(706)291-3166	APPROVED BY ANSI 01/13/92
C57.92	GUIDE FOR LOADING MINERAL OIL-IMMERSED POWER TRANSFORMERS UP TO & INCL 100 MVA WITH 55 C OR 65 C AVE. WINDING RISE			T&D	SUB	PSE		PUB. 1/12/81, REAFFIRMED 1991
PC57.91	INSULATION LIFE	L. W. PIERCE	PIERCE L.	03/21/91	06/28/85	1997	(706)291-3166	TO BE COMBINED INTO C57.91
C57.93	GUIDE FOR INSTALLATION OF LIQUID-IMMERSED POWER TRANSFORMERS.			NONE				BALLOTING REV. IN TC 04/26
PC57.93	WEST COAST	DAVID BRUCKER	GILLIES D. A.	/ /	06/01/89	0	(415)692-4431	WITHDRAW 12.11/12.12 WHEN APP.
C57.94	RECOMMENDED PRACTICE FOR INSTALLATION, APPLICATION, OPERATION & MAINTENANCE OF DRY-TYPE GEN PURPOSE DIST & POWER TR							PUB. 1982, REAFFIRMED 1987
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON		12/09/87	/ /	1987	(919)856-2420	BALLOTTING REAFFIRMATION
C57.95	GUIDE FOR LOADING LIQUID-IMMERSED STEP-VOLTAGE AND INDUCTION-VOLTAGE REGULATORS							NO WORK IN PROGRESS
NONE	INSULATION LIFE	L. W. PIERCE		03/21/91	/ /	1996	(706)291-3166	BALLOT FOR REAF. REQUESTED
C57.96	GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS			SCC14				MUST REAF. OR REV. BY DEC 94
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON	PIERCE L.	04/26/89	04/26/89	1994	(919)856-2420	
C57.96	GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS			T&D	SCC14	SCC10		BALLOTING REAF. CLOSES 04/18
PC57.96	DRY-TYPE TRANSFORMERS	W. PATTERSON	PIERCE L.	04/26/89	05/06/91	1994	(919)856-2420	NOT COMPLETED BY 10/93
C57.98	IEEE GUIDE FOR TRANSFORMER IMPULSE TESTS			NONE				REVISION APP. BY SB 12/02/93
PC57.98	DIELECTRIC TESTS	J. B. TEMPLETON	POULIN B.	06/01/86	02/01/86	1992	(317)289-1211	WAITING ANSI APPROVAL
C57.98	GUIDE FOR PERFORMING ROUTINE LIGHTNING IMPULSE TESTS ON DIST.TRANSFO			T&D	PSIM	PSC	ASC 62 EM	CLARIFY PAR BUSINESS
PC57.98a	DIELECTRIC TESTS	J. B. TEMPLETON	ROSSETTI J.	/ /	04/30/91	0	(317)289-1211	SUPPLEMENT TO C57.98
C57.99	GUIDE FOR LOADING DRY-TYPE AND OIL-IMMERSED CURRENT-LIMITING REACTORS							NEEDS REVISION
P731	STANDARDS	G. VAILLANCOURT		/ /	03/28/78	1990	(514)652-8515	NOT IEEE STANDARD
C57.100	TEST PROCEDURE FOR THERMAL EVALUATION OF OIL-IMMERSED DISTRIBUTION TRANSFORMERS			NPE	EM	T&D	SPD	APPROVED BY ANSI 12/02/92
C57.100	INSULATION LIFE	L. W. PIERCE	LONDERMILK L. A.	03/18/92	10/20/88	1997	(706)291-3166	REAFFIRMED 03/18/92

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C57.104	GUIDE FOR THE DETECTION AND DETERMINATION OF GENERATED GAS IN OIL-IMMERSED TRANSFORMERS & THEIR RELATION TO SERVICEABIL.			PSR T&D				NO WORK IN PROGRESS
PC57.104	INSULATING FLUIDS	F. GRYSZKIEWICZ	HEINRICHS F. W.	06/07/92	05/31/90	1996	(617)926-4900	PUBLISHED 1992
C57.105	GUIDE FOR APPLICATION OF TRANSFORMER CONNECTIONS IN THREE-PHASE DISTRIBUTION SYSTEMS							REAFFIRMED BY SB 06/17/92
PC57.105	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	REITTER G.	06/17/92	/ /	1997	(205)877-7740	BEING BALLOTED IN C57
C57.106	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF INSULATING OIL IN EQUIPMENT			NONE				PUBLISHED 1992
PC57.106	INSULATING FLUIDS	F. GRYSZKIEWICZ		11/20/91	06/19/86	1995	(617)926-4900	ANSI APPROVED 11/20/91
C57.109	GUIDE FOR THROUGH-FAULT CURRENT DURATION			PSR				WILL BALLOT C57
PC57.109	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	PATEL B.	03/16/93	06/27/91	1998	(205)877-7740	COMPLETE
C57.110	RECOMMENDED PRACTICE FOR ESTABLISHING TRANSFORMER CAPABILITY WHEN SUPPLYING NONSINUSOIDAL LOAD CURRENTS			T&D PSR NEMA				REAF. ANSI 07/93
PC57.110	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	MAREK R. P.	12/03/92	09/15/93	1997	(205)877-7740	PAR APPROVED 09/15/93
C57.111	GUIDE FOR ACCEPTANCE OF SILICONE INSULATING FLUID AND ITS MAINTENANCE IN TRANSFORMERS			IAS T&D ED&PG IEC				SUBMIT REAFIRMATION TO SB
NONE	INSULATING FLUIDS	F. GRYSZKIEWICZ		02/02/89	12/10/87	1994	(617)926-4900	
C57.112	GUIDE FOR THE CONTROL OF TRANSFORMER SOUND			NONE				NEW TASK FORCE TO START WORK
P523	AUDIBLE SOUND & VIBRATION	JEEWAN PURI	PURI J.	/ /	12/28/73	0	(704)282-7413	CHECK FILES FOR NEWER PAR
C57.113	GUIDE FOR PARTIAL DISCHARGE MEASUREMENT IN LIQUID-FILLED POWER TRANSFORMERS AND SHUNT REACTOR							PUBLISHED AS FULL-USE 1992
P545	DIELECTRIC TESTS	J. B. TEMPLETON	HOWELLS E.	12/05/91	09/25/91	1996	(317)289-1211	
C57.114	SEISMIC GUIDE FOR POWER TRANSFORMERS AND REACTORS			NPE SUBS.				TO BE WITHDRAWN (OBSOLETE)
P513	WEST COAST	DAVID BRUCKER	OKLU S.	02/15/90	09/06/73	1995	(415)692-4431	ANSI APPROVED 08/09/91
C57.115	GUIDE FOR LOADING MINERAL-OIL-IMMERSED POWER TRANSFORMERS RATED IN EXCESS OF 100MVA (65 C WINDING RISE)							COMPLETED COMMITTEE BALLOT
P756	INSULATION LIFE	L. W. PIERCE	PIERCE L. W.	03/21/91	/ /	1996	(706)291-3166	ANSI APPROVED 01/13/92

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C57.116	GUIDE FOR TRANSFORMERS DIRECTLTY CONNECTED TO GENERATORS							REAF BALLOT SUCCESSFUL
NONE	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	REITTER G.	01/03/89	/ /	1994	(205)877-7740	SUBMIT REAFFIRMATION TO SB
C57.117	GUIDE FOR REPORTING FAILURE DATA FOR POWER TRANSFORMERS AND SHUNT REACTORS							REAFFIRMED BY SB 06/17/92
P786	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	ALTMAN M.	06/17/92	/ /	1997	(205)877-7740	ANSI APPROVED 7/93
C57.119	RECOMMENDED PRACTICE FOR PERFORMING TEMP. RISE TESTS ON OIL-IMMERSED POWER TRANSFORMER AT LOADS BEYOND NP RATING (P838)	SNGR	SUBS	SCC4	PSRC	IAS	EI	NEW PAR APPROVED 09/17/92
P838	INSULATION LIFE	L. W. PIERCE	GRUBB R. L.	/ /	09/17/92	0	(706)291-3166	REVISED PAR (TITLE & SCOPE)
C57.120	LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS	SUB	EM	ED&PG	IAS	IEC		PUBLISHED 1992
P842	WEST COAST	DAVID BRUCKER	JACOBSEN R.	12/03/91	05/01/80	1996	(415)692-4431	APPROVED BY ANSI 02/28/92
C57.121	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF LESS FLAMMABLE HYDROCARBON FLUID IN TRANSFORMERS	PSRC	T&D	IAS	IEC			SUBMIT REAFFIRMATION TO SB
P954	INSULATING FLUIDS	F. GRYSZKIEWICZ		02/22/88	04/12/82	1994	(617)926-4900	
C57.123	GUIDE FOR TRANSFORMER LOSS MEASUREMENT							TF MORRING
P1096	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	HENNING W. R.	/ /	06/13/85	0	(205)877-7740	
C57.124	RECOMMENDED PRACTICE FOR THE DETECTION OF PD AND THE MEASUREMENT OF APPARENT CHARGE IN DRY-TYPE TRANSFORMERS	NONE						PUBLISHED 1992
PC57.124	DRY-TYPE TRANSFORMERS	W. PATTERSON	KLINE A. D.	06/29/91	06/27/91	1996	(919)856-2420	ANSI APPROVED 10/11/91
C57.125	GUIDE FOR FAILURE INVESTIGATION, DOCUMENTATION AND ANALYSIS FOR POWER TRANSFORMERS AND SHUNT REACTORS	T&D	ED&PG	PSE	SNGR			
PC57.125	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	ALTMAN M.	06/27/91	06/28/87	1996	(205)877-7740	ANSI APPROVED 11/20/91
C57.127	GUIDE FOR THE DETECTION OF ACOUSTIC EMISSIONS FROM PARTIAL DISCHARGES IN OIL-IMMERSED POWER TRANSFORMERS	T&D	ED&PG	CIGRE	IEC			REBALLOT MAIN COMMITTEE
PC57.127	DIELECTRIC TESTS	J. B. TEMPLETON	HOWELLS E.	/ /	03/10/88	0	(317)289-1211	WAITING FOR BALLOT
C57.128	FIRE PROTECTION OF OUTDOOR LIQUID-IMMERSED POWER TRANSFORMERS	NPE	SUB	PSR				DRAFT BEING PREPARED
PC57.128	WEST COAST	DAVID BRUCKER	HAGER R.	/ /	06/01/89	0	(415)692-4431	

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C57.129	GENERAL REQUIREMENTS & TEST CODE FOR OIL-IMMERSED HVDC CONVERTER TRANSFORMERS AND SMOOTHING REACTORS FOR DC POWER TRANSM			EM T&D PSIM SUB				BALLOTING D9 IN TC
PC57.129	HVDC CONVERTER TR & REACTOR	W. N. KENNEDY	KENNEDY W. N.	/ /	09/26/91	0	(317)286-9387	RESOLVING 3 NEGATIVES
C57.130	GUIDE FOR USE OF DISSOLVED GAS ANALYSIS DURING FACTORY THERMAL TESTSFOR THE EVALUATION OF OIL-IMMERSED TRANS. AND REACT.			NONE				DS BEING REVIEWED (TRIAL-USE)
PC57.130	INSULATING FLUIDS	F. GRYSZKIEWICZ	KINNEY J. P.	/ /	03/17/93	0	(617)926-4900	CHANGE IN TITLE AND SCOPE
C57.131	REQUIREMENTS FOR LOAD TAP CHANGERS			EM T&D				BALLOTING MAIN COMMITTEE
PC57.131	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	TRAUB T. P.	/ /	08/17/89	0	(205)877-7740	SUBMIT DOCUMENT TO SB
IEEE 259	TEST PROCEDURE FOR EVALUATION OF SYSTEMS OF INSULATION FOR SPECIALTY TRANSFORMERS							TO SUBMIT TO REVCOM
P259	DRY-TYPE TRANSFORMERS	W. PATTERSON	SIMPSON R. W. JR.	06/22/72	09/26/91	1979	(919)856-2420	TRYING TO ADAPT TO IEC
IEEE 637	GUIDE FOR THE RECLAMATION OF INSULATING OIL AND CRITERIA FOR ITS USE							REAFFIRMED 03/18/92
P637	INSULATING FLUIDS	F. GRYSZKIEWICZ		06/04/84	/ /	1997	(617)926-4900	
IEEE 638	QUALIFICATION OF CLASS 1E TR FOR NUCLEAR POWER GENERATING STATIONS			NPE SUB SC2		SCC10		APPROVED BY SB 03/18/92
P638	PERFORMANCE CHARACTERISTICS	BIPIN PATEL	PIERCE L. W.	/ /	10/29/90	1997	(205)877-7740	NEW PAR APPROVED 12/04/90
IEEE 799	GUIDE FOR HANDLING AND DISPOSING OF ASKARELS			EIS IAC T&D				REAFFIRMED 03/18/92
P799	INSULATING FLUIDS	F. GRYSZKIEWICZ		11/17/86	09/27/79	1997	(617)926-4900	
IEEE1258	GUIDE FOR INTERPRETATION OF GASES GENERATED IN SILICONE-IMMERSED TRANSFORMERS			T&D SCC14				PAR APPROVED BY SB 12/05/91
P1258	INSULATING FLUIDS	F. GRYSZKIEWICZ	GOUDIE JIM	/ /	12/05/91	0	(617)926-4900	PREPARING D07
IEEE1265	STANDARD FOR BAR CODING FOR DISTRIBUTION TRANSFORMERS (POLE-MOUNTED, PAD-MOUNTED AND UNDERGROUND)			AIM/TSC IAS/REP TD		EEI	NEMA	PAR APPROVED 06/27/91
P1265	DISTRIBUTION TRANSFORMERS	KEN HANUS	JORDAN RON	/ /	06/27/91	1994	(817)882-6020	TO BALLOT D5
IEEE1276	TRIAL-USE GENERAL REQUIREMENTS FOR LIQUID-FILLED DISTRIBUTION AND POWER TR UTILIZING HIGH TEMP SOLID INSULATING MATERIAL			T&D				
P1276	INSULATION LIFE	L. W. PIERCE	FISCHER H.	/ /	09/25/91	0	(706)291-3166	STUDYING HI-T MATERIALS

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IEEE1277	GENERAL REQUIREMENTS & TEST CODE FOR OIL-IMMERSED AND DRY-TYPE HVDC SMOOTHING REACTORS			SUB				NEW DRAFT BEING PREPARED
P1277	HVDC CONVERTER TR & REACTOR	W. N. KENNEDY		/ /	09/25/91	0	(317)286-9387	PAR APPROVED 09/26/91
IEEE1350	GUIDE FOR PROTECTION OF DISTRIBUTION TRANSFORMERS WITH EMPHASIS ON SECONDARY (LOW VOLTAGE SIDE) SURGES			SPD T&D IC				CONTINUE WORK IN SPD
P1350	DIELECTRIC TESTS	J. B. TEMPLETON	ROSSETTI J.	/ /	03/17/93	0	(317)289-1211	JOINT PROJECT WITH SPD
IEEE1388	STANDARD FOR THE ELECTRONIC REPORTING OF TRANSFORMER TEST DATA			EEI NEMA ASC X12 PSR		CS SAB		PREPARING D1
P1388	DISTRIBUTION TRANSFORMERS	KEN HANUS	McCAIN A.	/ /	09/15/93	0	(817)882-6020	NO. CHANGED FROM C57.132
NEW	GUIDE FOR THE LOCATION OF ACOUSTIC EMISSIONS FROM PARTIAL DISCHARGES IN OIL-IMMERSED POWER TRANSFORMERS							BALLOTTING WORKING GROUP
NO PAR YET	DIELECTRIC TESTS	J. B. TEMPLETON	HOWELLS E.	/ /	/ /	0	(317)289-1211	SUBMIT PAR AS SOON AS POSSIBLE
NEW	GUIDE FOR NOISE CONTROL IN OIL-IMMERSED POWER TRANSFORMERS							D1 READY
NEW	AUDIBLE SOUND & VIBRATION	JEEWAN PURI	McGILL J.	/ /	/ /	0	(704)282-7413	PAR NEEDED TO SUBMIT
NEW	LOSS EVALUATION GUIDE FOR DISTRIBUTION TRANSFORMERS							NEW WORKING GROUP
NEW	DISTRIBUTION TRANSFORMERS	KEN HANUS	DUCKETT D.	/ /	/ /	0	(817)882-6020	PAR NEEDED
NEW	GUIDE FOR APPLICATION, TESTING, INSTALLATION AND OPERATION OF PHASE ANGLE SHIFTING TRANSFORMERS							NEW PROJECT
NEW	WEST COAST	DAVID BRUCKER	McCULLA G.	/ /	/ /	0	(415)692-4431	PAR TO BE SUBMITTED

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PROJECT NO. / DATE	TITLE / PES COM.	CONTACT IN PES COMMITTEE.	CONTACT PHONE NO.	TRANSFORMERS COMMITTEE COORDINATOR	STATUS OF DOCUMENT SUBCOMMITTEE TR. COM.	COORD. PHONE
P1248 12/06/90	GUIDE FOR THE COMMISSIONING OF ELECTRICAL SYSTEMS IN HYDROELECTRIC POWER PLANTS ED&PG	LOUIS A. TAUBER	503-326-2323	D. A. GILLIES	WEST COAST	503-622-4847
NEW 02/15/94	MEASUREMENT OF POWER AT LOW POWER FACTOR PSIM	EDDY SO	613-993-2660	W. R. HENNING	PERFORMANCE CHARACTERISTICS	414-547-0121
NEW 03/04/94	GUIDE FOR VOLTAGE AND PHASING DETECTORS FOR USE IN HV SYSTEMS IN ELECTRIC POWER UTILITIES PSIM	PETER H. REYNOLDS	215-646-9200	G. H. VAILLANCOURT	STANDARDS	514-652-8515
P 4 02/02/89	STANDARD TECHNIQUES FOR HIGH-VOLTAGE TESTING PSIM	TERRY McCOMB	613-990-5826	G. VAILLANCOURT	BALLOTING IN PSIM DIELECTRIC TESTS	514-652-8515
P 62 03/17/94	GUIDE FOR DIAGNOSTIC OF POWER APPARATUS PSIM	DAVID TRAIN	617-926-4900	R. A. VEITCH	COMMITTEE BALLOT OF D7 STANDARDS	905-731-9178
P 454 03/31/94	PARTIAL DISCHARGE MEASUREMENTS PSIM	BARRY WARD	215-646-9200	G. H. VAILLANCOURT	WILL ADOPT IEC-270 STANDARDS	514-652-8515
P1122 12/03/92	DIGITAL RECORDERS FOR MEASUREMENTS IN HIGH VOLTAGE IMPULSE TESTS PSIM	T. R. McCOMB	613-990-5826	BERTRAND POULIN	APPROVED BY SB 03/17/94 DIELECTRIC TESTS	408-957-8326
P1223 08/17/89	POWER SYSTEM DIGITAL TESTING TECHNIQUES PSIM	T. R. McCOMB	613-990-5826	R. MINKWITZ, SR.	DIELECTRIC TESTS	617-828-3241
P1304 06/18/92	CURRENT MEASURING SYSTEMS WHICH USE OPTICAL TECHNIQUES PSIM	T. R. McCOMB	613-990-5826	J. M. DAVIS	INSTRUMENT TRANSFORMERS	404-393-9831
PC37.107 12/28/85	STANDARD FOR DIGITAL PROTECTION SYSTEM DESIGN PSR	STIG L. NILSSON	415-855-2314	JIM HARLOW	DIELECTRIC TESTS	813-535-3408
PC37.108 09/28/84	GUIDE FOR THE PROTECTION OF NETWORK TRANSFORMERS PSR	THOMAS E. WIEDMAN	312-394-2593	D. M. MULKEY	REAFFIRMED 1994 UG TR & NETWORK PROTECTORS	415-973-4699

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PC37.109 03/28/85	GUIDE FOR THE PROTECTION OF SHUNT REACTORS	PSR	LAVERN L. DVORAK	303-231-1636	MIKE ALTMAN	REAFFIRMED 1993 PERFORMANCE CHARACTERISTICS	407-694-4975
PC37.110 05/31/90	GUIDE FOR THE APPLICATION OF CURRENT TRANSFORMERS USED FOR PROTECTIVE RELAYING PURPOSES	PSR	GRAHAM CLOUGH	206-737-6912	JOHN W. DAVIS	INSTRUMENT TRANSFORMERS	404-393-9831
PC37.91 03/19/92	GUIDE FOR PROTECTIVE RELAY APPLICATION TO POWER TRANSFORMERS	PSR	MIRIAM SANDERS	919-856-2457	ROB BARKER	PERFORMANCE CHARACTERISTICS	804-257-4671
PC37.97 12/10/87	GUIDE FOR PROTECTIVE RELAY APPLICATION TO POWER SYSTEM BUSES	PSR	STEVE CONRAD	505-848-2642	JOHN W. DAVIS	ANSI APPROVED 05/20/91 INSTRUMENT TRANSFORMERS	404-393-9831
PC57.13.1 12/31/80	GUIDE FOR FIELD TESTING OF RELAYING CURRENT TRANSFORMERS	PSR	ARUN G. PHADKE	703-231-7029	JOHN W. DAVIS	REAFFIRMED 1992 INSTRUMENT TRANSFORMERS	404-393-9831
C62.62 03/21/91	PERFORMANCE CHARACTERISTICS FOR SURGE PROTECTIVE DEVICES CONNECTED TO LOW VOLTAGE AC POWER CIRCUITS	SPD	LEWIS DOUGLAS SWEENEY	602-834-9372	MAHESH P. SAMPAT	REPLACE P1038 DIELECTRIC TESTS	704-462-3226
PC62.11 06/14/94	STANDARD FOR METAL-OXIDE SURGE ARRESTERS FOR AC POWER CIRCUITS	SPD	R. M. SIMPSON	919-836-7059	W. A. MAGUIRE	NEW PAR DIELECTRIC TESTS	501-377-4273
PC62.2.01 06/01/84	APPLICATION GUIDE FOR SURGE PROTECTION OF ELECTRIC GENERATING PLANTS	SPD	G. L. GAIBROIS	313-237-9332	D. H. MULKEY	UG TR & NETWORK PROTECTORS	415-973-4699
PC62.22 12/02/93	GUIDE FOR APPLICATION OF METAL OXIDE SURGE ARRESTERS FOR AC SYSTEMS	SPD	J. WOODWORTH	716-375-7270	ROBERT DEGENEFT	WILL INCLUDE DIST. TRANSFORMER DIELECTRIC TESTS	518-276-6367
PC62.42 07/18/94	GUIDE FOR THE APPLICATION OF LOW-VOLTAGE SURGE PROTECTIVE DEVICES	SPD	R. DAVIDSON JR.		MAHESH P. SAMPAT	REVISED PAR DIELECTRIC TESTS	704-462-3226
P 693 09/18/90	RECOMMENDED PRACTICE FOR SEISMIC DESIGN OF SUBSTATIONS	SUBS	RULON FRONK	213-481-3327	DAVID BRUCKER	NEW PAR 12/93 WEST COAST	415-692-4431

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P 979 06/18/92	GUIDE FOR SUBSTATION FIRE PROTECTION SUBS	A. J. BOLGER	604-663-2879	D. W. SUNDIN	MUST COMPLETE IN 1994 WEST COAST	414-524-3221
P 980 09/17/92	GUIDE FOR THE CONTAINMENT AND CONTROL OF OIL-SPILLS IN SUBSTATIONS SUBS	RICHARD G. COTTRELL	517-788-0817	F. GRYSZKIEWICZ	GUIDE EXTENDED TO 12/94 INSULATING FLUIDS	617-926-4900
P1268 03/30/91	GUIDE FOR INSTALLING TEMPORARY SUBSTATIONS SUBS	SHASHI G. PATEL	404-362-5386	D. A. GILLIES	D1 READY FOR WG COMMENTS WEST COAST	503-622-4847
P1303 09/17/92	GUIDE FOR STATIC VAR COMPENSATOR FIELD TESTS SUBS	PHILIP R. HANNERY	914-577-2591	R. F. DUDLEY	APPROVED BY SB 06/94 DRY TYPE	416-298-8108
P1291 10/22/91	GUIDE FOR PARTIAL DISCHARGE MEASUREMENTS IN POWER SWITCHGEAR SWGR	E. F. VEVERKA	414-835-1544	G. H. VAILLANCOURT	ANSI APPROVED 08/30/93 STANDARDS	514-652-8515
P1325 03/17/92	RECOMMENDED PRACTICE FOR REPORTING FIELD TROUBLE DATA FOR POWER CIRCUIT BREAKERS SWGR	D. M. LARSON	203-634-5739	G. H. VAILLANCOURT	INFORMATION COPY REQUESTED STANDARDS	514-652-8515
PC37.04h 09/26/90	MECHANICAL LOADING REQUIREMENTS OF CIRCUIT BREAKER TERMINALS SWGR	GEORGE R. HANKS	615-751-4020	LOREN B. WAGENAAR	SUPPLEMENT APPROVED 1991 BUSHINGS	614-223-2259
PC37.10 05/01/91	GUIDE FOR DIAGNOSTICS AND FAILURE INVESTIGATION OF POWER CIRCUIT BREAKERS SWGR	L. ROLANDO SAAVEDRA	504-363-8765	WALLACE B. BINDER JR.	DRAFT IN REVISION IN WG PERFORMANCE CHARACTERISTICS	216-384-5625
P 656 03/08/91	STANDARD FOR THE MEASUREMENT OF AUDIBLE NOISE FROM OVERHEAD TRANSMISSION LINES T&D	JAMES R. STEWART	518-395-5025	ALAN M. TEPLITSKY	PUBLISHED 12/92 AUDIBLE SOUND AND VIBRATION	212-460-4859
P 957 09/17/92	GUIDE FOR CLEANING INSULATORS T&D	WILLIAM L. GIBSON	415-973-3747	L. B. WAGENAAR	OLD GUIDE EXTENDED TO 12/94 BUSHINGS	614-223-2259
P1030.3 12/05/91	GUIDE FOR SPECIFICATION OF HVDC PERFORMANCE - PART III, DYNAMIC PERFORMANCE T&D	LEWIS VAUGHAN	514-652-8457	WILLIAM N. KENNEDY	DISCUSSING DRAFT IN WG HVDC CONV. TR & SMOOTHING REAC	317-286-9387

COORDINATION ACTIVITY OF IEEE/PES TRANSFORMERS COMMITTEE

LIST OF LIAISON REPRESENTATIVES

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ACRONYM	SOCIETY/COMMITTEE	LIAISON REPRESENTATIVE	PHONE NUMBER
AIM/TSC	AUTOMATIC IDENTIFICATION MANUFACTURERS (TSC COMM.)		
CS	COMPUTER SOCIETY	G. S. ROBINSON	(508) 442-0248
ED&PG	ENERGY DEVELOPMENT AND POWER GENERATION COMMITTEE	C. A. LENNON JR.	(702) 293-8817
EEI	EDISON ELECTRIC INSTITUTE (T&D COMM.)	M. C. MINGOIA	(202) 508-5177
EI	ELECTRICAL INSULATIONS	E. A. BOULTER	(508) 546-3009
EM	ELECTRIC MACHINERY COMMITTEE	B. GUPTA	(416) 231-4111
IAS	INDUSTRY APPLICATION SOCIETY	B. C. JOHNSON	(512) 396-5880
IAS/PSE	IAS/POWER SYSTEM ENGINEERING COMMITTEE	R. W. INGHAM	(313) 236-0130
IAS/REP	IAS/RURAL ELECTRIC POWER COMMITTEE	C. HERTZ	(217) 563-8333
IC	INSULATED CONDUCTORS COMMITTEE	F. E. KIMSEY	(704) 373-6562
IEC	INTERNATIONAL ELECTROTECHNICAL COMMISSION	R. S. GIRGIS	(317) 286-9532
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION	J. GAUTHIER	(202) 457-8400
NPE	NUCLEAR POWER ENGINEERING COMMITTEE	J. D. LAMONT	(803) 725-1649
PSC	POWER SYSTEM COMMUNICATIONS COMMITTEE	G. Y. ALLEN	(416) 259-7986
PSE	POWER SYSTEM ENGINEERING COMMITTEE	R. BEDNARIK	(212) 460-2943
PSIM	POWER SYSTEM INSTRUMENTATION MEASUREMENT COMMITTEE	T. R. MC COMB	(613) 990-5826
PSRC	POWER SYSTEM RELAYING COMMITTEE	R. W. HAAS	(513) 231-2584
SCC14	COORD. COM. ON QUANTITIES UNITS AND LETTER SYMBOLS	B. BARROW	(703) 285-5444
SCC4	COORDINATING COMMITTEE ON THERMAL RATING	P. E. ALEXANDER	(219) 458-4576
SPD	SURGE PROTECTIVE DEVICES COMMITTEE	J. B. POSEY	(216) 887-5129
SUBS	SUBSTATIONS COMMITTEE	GARY ENGMANN	(407) 240-9013
SWGR	SWITCHGEAR COMMITTEE	D. F. PEELO	(604) 528-3034
TC	TRANSFORMERS COMMITTEE	G. H. VAILLANCOURT	(514) 652-8515
TSC	TECHNICAL SYMBOLOGY COMMITTEE (PART OF AIM)		
T&D	TRANSMISSION AND DISTRIBUTION COMMITTEE	F. D. MYERS	(314) 682-8401

IEEE/PES TRANSFORMERS COMMITTEE ATTENDANCE STATISTICS

GROUPS	Baltimore Nov 1991	Birmingham Apr. 1992	Cleveland Oct 1992	Portland Mar 1993	St. Pete Nov. 1993	Dallas Mar 1994	Milwaukee Sep. 1994	MAX	AVG
Committee Registration: Members and Guests	247	285	245	213	283	247	275	285	256
Spouses	59	45	40	48	97	43	55	97	55
Luncheon	117	138	120	112		125	149	149	127
SC ADMINISTRATIVE	21	18	18	16	21	20	22	22	19
SC AUDIBLE NOISE AND VIBRATION	25	36	0	26		29	32	36	25
SC BUSHINGS	37	31	22	17	18	39	36	39	29
WG Bushing Application Guide	19	21	27	21	19	22	23	27	22
WG DC Applications of Bushings	14	15	12	17	13	17	19	19	15
WG Revision C57.19.01	11	15	13	12	13	22	23	23	16
SC DIELECTRIC TESTS	72	93	104	88	98	79	84	104	88
WG Revision of Dielectric Tests	53	56	58	40	60	53	56	60	54
TF on Revision of the Induced Test	25			25	33	38	30	38	30
TF Metal Oxide Surge Arrester Coordination			27	27	35	25	35	35	30
WG Rev. Dielectric Tests on Distr. Transf.	21	29	19	17			16	29	17
TF Rev. Distr. Impulse Guide	25						17	25	21
WG Partial Discharge Tests	67	46	40	66	28	23	27	67	42
SC DISTRIBUTION TRANSFORMERS	34	28	35	35	52	47	49	52	40
WG Overhead Type Distr. Transfs. C57.12.20		23	23	23	35	34	34	35	29
WG Single-Phase Submersible C57.12.23							15 *	15	15
WG Single-Phase Deadfront Padmount C57.12.25		28	28	28	28	30	28	30	28
WG Bar Coding						22	30	30	26
WG Loss Evaluation						44	57	57	51
WG Electronic Data Transmittal						27	36	36	32
WG Combination of C57.12.22 and .26						27	28	28	28
WG Step-Voltage and Induction Regs C57.15							25	25	25
SC DRY-TYPE TRANSFORMERS	29	42	26	39	38	33	41	42	35
WG Test Code C57.91	22	31	25	31	27	24	28	31	27
WG Dry-Type Reactors	12	15	9	12	7	7	12	15	11
WG Dry-Type Reactors - HVDC Smoothing					8	5	10	10	8
WG Dry-Type Thermal Eval. and Flammability	0	27	16	26	20			27	18
WG Dry-Type General Requirements C57.12.01					31	21	21	31	24
WG Insulation Req. for Specialty Transf.	12	20	11	6	11	8	10	20	11
WG Cast Coil Loading Guide	22	25	19	30	17	17	16	30	21
WG Hot Spot Diferentials					27	16	31	31	25
SC HVDC CONVERTER TRANSFORMERS AND REACTORS	9	11	13	19	17		15	19	14

NOTE: Data maintained for four years only.

* = estimated

IEEE/PES TRANSFORMERS COMMITTEE ATTENDANCE STATISTICS

GROUPS	Baltimore Nov 1991	Birmingham Apr 1992	Cleveland Oct 1992	Portland Mar 1993	St Paul Nov 1993	[illegible] Mar 1994	Milwaukee Oct 1994	MAX	AVG
SC INSTRUMENT TRANSFORMERS	22	23	26	21	28	21	13	28	22
WG Test Req Instr Transf >115 kVA							22	22	22
WG Revision of C57.13							11	11	11
SC INSULATING FLUIDS	54	68	61	57	62	50	44	68	57
WG Gas Analysis During Factory Tests				57	62		44	62	54
WG Gas Analysis Silicone Transformers							44	44	44
SC INSULATION LIFE	91	71	138	83	60	63	45	138	79
WG Guides for Loading	62	74	70	69	73	61		74	68
WG Thermal Eval. of Distr. and Power Transf.	35	40	32	38	35	11		40	32
WG Thermal Tests	54	48	32	34	39	30	58	58	42
TF Revision of Temperature Test Code							20	20	20
TF Thermal Duplicate						27	31	31	29
TF Hottest Spot Temp. Rise						31	36	36	34
WG High Temperature Insulation	33	59	60	55	58	52	48	60	52
SC PERFORMANCE CHARACTERISTICS	85	86	69	60	97	83	93	97	82
WG Loss Tolerance and Measurement	37	26	38	39	32	35	45	45	36
TF Loss Measurement Guide							16	16	16
TF Low Power Factor Measurements							33	33	33
WG LTC Performance Requirements	30	25	37	38	37	37	41	41	35
WG PCS Rev. C57.12.00						20	21	21	21
WG PCS Rev. C57.12.90						15	19	19	17
WG Revision C57.110				38	32	35	30	38	34
WG Semi-Conductor Rectifier Transformers	23	30	23	31	23	23	22	31	25
TF Survey GSU Transf Failures							16	16	16
SC STANDARDS [illegible]						13	12	13	13
							21	21	21
SC UNDERGROUND TRANSFORMERS AND NETWORK PROTECTORS	25	21	17	17	19	20	19	25	20
WG Three-Phase Underground Transfs.	19	16	14	9	16	16	16	19	15
WG Liquid-Filled Sec. Network Transfs.	19	21	17	16	15	16	15	21	17
WG Secondary Network Protectors	17	16	19	13	20	17	13	20	16
WG Dry-Type Network Transfs.	31	29	15	18	12	10	12	31	18
SC [illegible]	0	10	14	0			0	14	4
WG Consolidation of Installation Guides	0		0	0			0	0	0
WG Seismic Guide	0		0	0			0	0	0
WG Loss Evaluation Guide	0		0	0			0	0	0
WG Fire Protection	0		0	0			0	0	0

filename=/TCATTEND.xls

NOTE: Data maintained for four years only.

* = estimated

Attachment 5

A Tribute to

Henry J. Windisch

IEEE Transformers Committee Meeting
Milwaukee, Wisconsin
September 28, 1994

It was a distinct honor and a solemn privilege for me when Jim Harlow asked me to pay tribute to Henry Windisch at our meeting today.

Henry was a project manager at Black and Veatch. He was also manager of Underground Transmission. During his career which spanned over 40 years, he was involved in more than 70 projects throughout the world. And, --of course--, he was a Senior Member of IEEE and a member of the Transformers Committee where he actively participated in the Dry Type Transformers Subcommittee.

Born in Louisburg, Kansas, he graduated from Kansas State University in 1957 with a Bachelors degree in Electrical Engineering. He was a Registered Professional Engineer in several states.

One of his colleagues had this to say of him, "Henry will be remembered as an excellent engineer and mentor that each of us learned from every time we talked to him. But his greater legacy is that he was a sincerely good person who treated everyone with genuine kindness and respect".

Another said, "I met Henry in 1973 and got to know him quite well over the years. He was a first class, genuine individual --- The type of guy everybody wants as a friend. He will be sincerely missed and this is certainly a loss to Black and Veatch and to society as a whole".

Ever since our first dinner with Henry and Winnie at the Little Rock meeting of this Committee, Betty and I have come to know them as a couple who cared deeply for each other and their family. Henry was a perfect gentleman, a warm personal friend as well as an outstanding engineer.

Henry was well liked and respected by all the members and guests of the Transformers Committee who worked with him. He was a good example for all of us.

We will all miss him.

William H. Mutschler, Jr.

IEEE CIGRE

Five strategic directions for work

RELIABILITY
LIFE MANAGEMENT
STRATEGIC ISSUES
NEW CONCEPTS
STANDARDISATION

IEEE CIGRE

STRATEGIC DIRECTIONS FOR SC12

RELIABILITY

- Reliability, availability, dependability
- Bushings, OLTC
- Particles in oil
- Instrument transformers

IEEE CIGRE

STRATEGIC DIRECTIONS FOR SC12

LIFE MANAGEMENT

- Maintenance
- Diagnostics
- Total costs of ownership
- Effective transformers
- Efficiency (reduced loss)

IEEE CIGRE

STRATEGIC DIRECTIONS FOR SC12

STRATEGIC ISSUES (Regulatory, legislative, environmental)

- EMC
- PCB
- Safety (Failure modes, tank rupture)
- Substitute materials (Oils)

IEEE CIGRE

STRATEGIC DIRECTIONS FOR SC12

NEW CONCEPTS

- Superconducting materials
- Design, manufacture, testing
- Application of materials
- Amorphous steels
- FACTS (electronic tapchangers)

IEEE CIGRE

STRATEGIC DIRECTIONS FOR SC12

STANDARDISATION

- Loss measurement
- HVAC dielectric testing
- HVDC converter transformers

IEEE CIGRE

WORKING GROUPS OF CIGRE SC12

WG12.09	Thermal aspects of transformers	J Aubin (CA)
JWG12/14.10	Transformers for DC application	A Lindroth (SE)
WG12.11	Fast transients	E E Henricksen (NO)
WG12.12	Sound intensity measurements	J G Paulick (DE)
JWG12/15.13	Static electrification	S Lindgren (US)
WG12.14	Reliability survey	B Corderoy (AU)
WG12.15	Specifications	A C Hall (UK)
WG12.16	Instrument transformers	P Tantin (FR)

IEEE CIGRE

PLANNED NEW WORKING GROUPS FOR SC12

Particles in oil	J Aubin (CA)
Life management	V K Sokolov (CIS)
Impact of accessories on reliability	
Strategic issues	
Relationship between short circuit test and stresses in service	

IEEE CIGRE

CIGRE has: 46 National Committees
791 Collective Members
3101 Individual Members

IEEE CIGRE

CIGRE Study Committee 12

is the mirror of

IEEE Transformers Committee

IEEE CIGRE

1904 - IEC formed at St Louis during International Electrical Congress

1921 - CIGRE formed under IEC

IEEE CIGRE

FIELD OF ACTIVITY - range of equipment

Transformers:	**Generator, inter-tie, system, industrial, converter, phase-shifting, quad boosters**
Transformers:	**Current, voltage**
Reactors:	**Shunt, series, saturated**
Components:	**Bushings, tapchangers**

IEEE CIGRE

FIELD OF ACTIVITY - aspects of design and manufacture

Specification of equipment
Design: concept, analysis, calculation
Manufacture: drying, reduction of cycle time
Testing: thermal, dielectric
Commissioning
Quality assurance
Lifetime costing
Reliability
Dependability

IEEE CIGRE

FIELD OF ACTIVITY - material selection and application

Insulation materials: oil, paper, pressboard, plastics, resin, gas
Insulation structures: windings, connections
Conductors: copper, aluminum, superconductors
Magnetic materials: silicon iron, amorphous steel
Cooling systems

IEEE CIGRE

FIELD OF ACTIVITY - utilisation

Maintenance
Condition monitoring
Life management
Repair and refurbishment

IEEE CIGRE

FIELD OF ACTIVITY - safety health, environment

Product safety assurance
Risk analysis
Noise
Oil spillage: tank rupture
Fire and explosion

IEEE CIGRE

1990's - a time of change

New trading blocks
Transnational mergers
Privatisation
Deregulation
Unbundling
Third party access

IEEE CIGRE

EVOLUTION OF ELECTRIC POWER SYSTEMS

Changing customer base

- **Unbundling**
- **Larger networks (Third party access)**
- **New trading blocks**
- **Mergers of manufacturers**
- **CCGT**
- **Nuclear uncertainty**
- **FACTS**
- **Maintenance practices**
- **Repair, refurbishment policies**
- **Financial constraints**

IEEE CIGRE

EVOLUTION OF ELECTRIC POWER SYSTEMS

Environmental factors

- **EMC**
- **Noise**
- **Oil spillage**
- **PCB contamination**
- **Energy efficiency**

IEEE CIGRE

IMPACT OF DRIVING FACTORS ON SC12

- **Fewer new transformers**
- **Replacement or repair decision criteria**
- **Reduction in manufacturing times**
- **Reliability and cost issues high profile**
- **Maintenance costs and benefits**
- **Purchasing specifications to common base**
- **Product safety assurance**
- **New materials**

IEEE CIGRE

STRATEGIC DIRECTIONS

Improved reliability
More efficient transformers
Reduced costs of ownership
More effective transformers
Design and manufacture
Application of materials
Application of components, appurtenances
New concepts

Developing Standards with IEC:

- *A seminar for PES standards leaders*

Why the IEC?

- Trend to one worldwide market
- Diminishing roll of national standards
- Market share
- International trade agreements

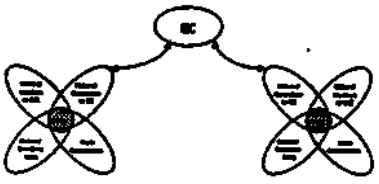
PES Standards Vision

- Shed the image that PES is a developer of only US Standards
- Develop PES standards that are recognized worldwide
- Enhance liaisons with standards organizations worldwide

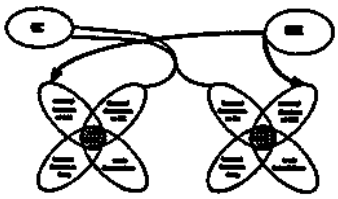
Implementation Steps

- Familiarize PES members with IEC
- Review and Compare PES and IEC standards
- Streamline preparation of PES standards

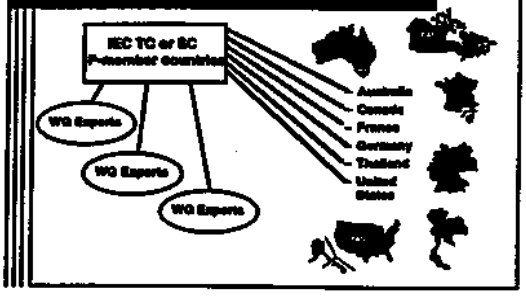
IEC is made up of 49 member countries



IEEE members worldwide influence IEC decisions



How does the work flow?



The job hunt is through your country's national committee

- International
  - Membership by countries on TCs and SCs
  - Project leaders
  - Experts serve as individuals on WG
- National
  - Advisory Groups (committees)

How to start in PES

- Select specific standards
  - In Revision
  - In development
- Compare the PES and IEC standards
  - Use a panel
  - Use a task force
  - Use a Working Group
- If you decide to differ, explain why

How to start in IEC

- Justify your proposal
- Understand related IEC standards
  - New Work Item
  - New Field of Technical Activity
- Input must be early & continuous
- Build mutual cooperation

How staff can help?

- Finding related IEC standards
- Finding national representatives to IEC
- Consulting on how to advance work in IEC

Keeping others informed

- Report IEEE/IEC standards equivalency to Anne O'Neill, PES International Program Engineer +1 (908) 562-3852
- Report new IEEE submissions to IEC to Michelle Phillips-Green Administrator, Copyrights & Trademark +1 (908) 562-3904

G.3 "Fast-track procedure"

G.3.1 Proposals to apply the fast-track procedure may be made as follows.

G.3.1.1 Any P-member and any category A liaison organization of a concerned technical committee may propose that an **existing standard from any source** be submitted for vote as a draft International Standard. The proposer shall obtain the agreement of the originating organization before making a proposal. The criteria for proposing an existing standard for the fast-track procedure are a matter for each proposer to decide, but proposals falling within the scope of technical committees other than ISO/IEC JTC 1 and ISO/TC 184 shall be submitted to the Technical Management Board for prior approval.

G.3.1.2 An international standardizing body recognized by the IEC Council may propose that **a standard developed by that body** be submitted for vote as a draft International Standard.

G.3.1.3 An organization having entered into a formal technical agreement with IEC may propose, in agreement with the appropriate technical committee or sub-committee, that **a draft standard developed by that organization** be submitted for vote as a final committee draft within that technical committee or sub-committee.

G.3.2 The proposal shall be received by the Chief Executive Officer, who shall take the following actions:

a) settle the copyright and/or trademark situation with the organization having originated the proposed document, so that it can be freely copied and distributed to national bodies without restriction;

b) for cases G.3.1.1 and G.3.1.3, assess in consultation with the relevant secretariats which technical committee/sub-committee is competent for the subject covered by the proposed document; where no technical committee exists competent to deal with the subject of the document in question, the Chief Executive Officer shall refer the proposal to the Technical Management Board, which may request the Chief Executive Officer to submit the document to the approval stage and to establish an ad hoc group to deal with matters subsequently arising;

c) ascertain that there is no evident contradiction with other International Standards;

d) distribute the proposed document as a draft International Standard (cases G.3.1.1 and G.3.1.2) in accordance with 2.6.1, or as a final committee draft (case G.3.1.3) in accordance with 2.5.8, indicating (in cases G.3.1.1 and G.3.1.3) the technical committee/sub-committee to the domain of which the proposed document belongs; in the case of particularly bulky documents, the Chief Executive Officer may request the necessary number of copies from the proposer.

G.3.3 The period for voting and the conditions for approval shall be as specified in 2.6 or 2.5 respectively. In the case where no technical committee is involved, the condition for approval of a draft International Standard is that not more than one-quarter of the total number of votes cast are negative.

G.3.4 If, for a draft International Standard, the conditions of approval are met, the document shall progress to the publication stage (2.7). If not, the proposal has failed and any further action shall be decided upon by the

technical committee/sub-committee to which the DIS was attributed in accordance with G.3.2 b), or by discussion between the originating organization and the office of the CEO if no technical committee was involved.

If the standard is published, its maintenance shall be handled by the technical committee/sub-committee to which the document was attributed in accordance with G.3.2 b), or, if no technical committee was involved, the approval procedure set out above shall be repeated if the originating organization decides that changes to the standard are required.

If, for a final committee draft, the conditions of approval are met, the draft standard shall progress to the approval stage (2.6). If not, the proposal has failed and any further action shall be decided upon by the technical committee/sub-committee to which the document was attributed in accordance with G.3.2 b).

NEW WORK ITEM PROPOSAL	
Reference number (assigned by Central Office)	
Proposer	Date of proposal
TC/SC	Secretariat

A proposal for a new work item within the scope of an existing technical committee or sub-committee shall be submitted to the Central Office. The proposal will be circulated to the P-members of the technical committee or sub-committee for voting, and to the O-members for information. The proposer may be a National Committee of the IEC, the secretariat itself, another technical committee or sub-committee, an organization in liaison, the Committee of Action or one of the advisory committees, or the General Secretary. Guidelines for proposing and justifying a new work item are given in ISO Guide 26.

The proposal (to be completed by the proposer)

Title of proposal	
Scope (as defined in 2.3.2 of part 3 of the ISO/IEC Directives)	
Purpose and justification (attach a separate page as annex, if necessary) Target date (indicate the date by which the availability of the International Standard is considered to be necessary):	
Relevant documents to be considered	
Relationship of project to activities of other international bodies	
Liaison organizations	Need for coordination within ISO/IEC
Preparatory work ☐ A draft is attached ☐ An outline is attached and it will be possible to supply a draft by (date): ..... ☐ It is not possible to supply a draft or an outline	
Concerns known patented items ☐ yes ☐ no If yes, provide full information as an annex	Signature of the proposer
Date of circulation	Closing date for voting

Comments and recommendations of the TC or SC secretariat

Comments with respect to the proposal in general, and recommendation thereon

Elements to be clarified when proposing a new work item (new standard)

Title
Indicate the subject matter of the proposed new standard.

Scope
Give a clear indication of the coverage of the proposed new work item and, if necessary for clarity, exclusions.

Purpose and justification
Give details based on a critical study of the following elements wherever practicable.

a) The specific aims and reason for the standardization activity, with particular emphasis on the aspects of standardization to be covered, the problems it is expected to solve or the difficulties it is intended to overcome.

b) The main interests that might benefit from or be affected by the activity, such as industry, consumers, trade, governments, distributors.

c) Feasibility of the activity: Are there factors that could hinder the successful establishment or general application of the standard?

d) Timeliness of the standard to be produced: Is the technology reasonably stabilized? If not, how much time is likely to be available before advances in technology may render the proposed standard outdated? Is the proposed standard required as a basis for the future development of the technology in question?

e) Urgency of the activity, considering the needs of other fields or organizations. Indicate target date and, when a series of standards is proposed, suggest priorities.

f) The benefits to be gained by the implementation of the proposed standard; alternatively, the loss or disadvantage(s) if no standard is established within a reasonable time. Data such as product volume or value of trade should be included and quantified.

g) If the standardization activity is, or is likely to be, the subject of regulations or to require the harmonization of existing regulations, this should be indicated.

If a series of new work items is proposed the purpose and the justification of which is common, a common proposal may be drafted including all elements to be clarified and enumerating the titles and scopes of each individual item.

Relevant documents
List any known relevant documents (such as standards and regulations), regardless of their source. When the proposer considers that an existing well-established document may be acceptable as a standard (with or without amendments) indicate this with appropriate justification and attach a copy to the proposal.

Cooperation and liaison
List relevant organizations or bodies with which cooperation and liaison should exist.

Preparatory work
Indicate whether the proposer or the proposer's organization is prepared to undertake the preparatory work required for the new work item.

Comparable IEEE/IEC standards
sorted by PES Technical Committees

(R) related

IEEE 281 -1984 Pwr Sys Commun

IEC 1085 -1992 TC57

General considerations for Telecommunication Services for Electric Power Systems

See also none

Status

Source John Thorson USTA for TC57 6/2/94

(R) related

IEC 870 far more detailed than C37.1

IEEE C37.1 -1987 Pwr Sys Commun

Standard definition Specification & Analysis of systems Used for Supervisory Control, Data Acquisition and Automatic Control

IEC 870-series TC57

Telecontrol equipment & systems

See also IEC 481, IEC 495, IEC 663, IEC 834 series

Status

Source John Thorson USTA for TC57 5/18/94

(R) related

roughly compatible application guides

IEEE 281-1984 Pwr Sys Commun

Standard Service conditions for Power System Communications Equipment

IEC 870-2-1-1987 TC57

Telecontrol equipment & systems: Part 2: Operating conditions, Sect. 1 - Environmental conditions and power supplies

See also none

Status No committee to revise IEEE 281. Not compatible with ANSI C93 work

Source Walter R. Seamon, GE 6/2/94

(N) no comparable document

IEC's is only single-sideband

IEEE 643 -1980 Pwr Sys Commun

Guide for Power-Line Carrier Applications

IEC

See also none

Status Slow revision in process, manpower needed

Source Walter Seamon GE 5/18/94

(P) partly equivalent or corresponding

IEEE revision will remove editorial differences

IEEE 4 -1978 Pwr Sys Instr & Msrmnt

Techniques for HighVoltage Testing

IEC 52 - 1960 TC42

Voltage measurement by means of sphere-gaps (one sphere earthed)

See also IEC 60 series

Status IEEE in revision

Source T. McComb, Sect of TC42 5/18/94

(P) partly equivalent or corresponding

IEEE revision will remove editorial differences

IEEE 4-1978 Pwr Sys Instr & Msrmnt

Techniques for HighVoltage Testing

IEC 60 - series TC42

High voltage test techniques

See also IEC 52

Status IEEE in revision

Source T. McComb, Sect of TC42 5/18/94

(N) no comparable document

IEEE contributing to IEC revision

IEEE Pwr Sys Instr & Msrmnt

IEC 270-1981 TC42

Partial discharge measurements

See also none

Status IEC in revision

Source T. McComb, Sect of TC42 5/18/94

(N) no comparable document

IEEE

IEC 790 - 1984 TC 42

Oscilloscopes & peak voltmeters for impuse tests

See also none

Status

Source T. McComb, sect TC 42 5/17/94

Comparable IEEE/IEC standards
sorted by PES Technical Committees

(E) technically equivalent

IEC is based on IEEE

IEEE 1227-1990 Trans & Distrb

Guide for the Measurement of DC Electric-Field Strength and Ion Related Quantities

IEC 833 - 1987 TC 42

Measurements of power-frequency electric fields

See also none

Status

Source T. McComb, sect TC 42 5/18/94

(N) no comparable document

IEEE Pwr Sys Instr & Msrmnt

IEC 1083-2-DIS TC 42

Digital recorders for measurements in high voltage impulse tests - Part 2: Digital signal processing

See also none

Status

Source T. McComb, sect TC 42 5/18/94

(N) no comparable document

IEEE Pwr Sys Instr & Msrmnt

IEC 1083-1-1991 TC 42

Digital recorders for measurements in high voltage impulse tests - Part 1: Requirements for digitial recorders

See also none

Status

Source T. McComb, sect TC 42 5/18/94

(I) identical

IEEE 1122-1987 Pwr Sys Instr & Msrmnt

Standard for Digital Recorders for Measurement in High-Voltage Impulse Test

IEC 1180-1-1992 TC 42

High voltage test techniques for low voltage equipment- Part 1:Definitions, test & procedure

See also none

Status

Source T. McComb, sect TC 42 5/18/94

(N) no comparable document

IEEE Pwr Sys Instr & Msrmnt

IEC 1180-2-DIS TC 42

High voltage test techniques for low voltage equipment- Part 2: Test equipment

See also none

Status DIS being monitored for possible IEEE adoption

Source T. McComb, sect TC 42 5/18/94

(N) no comparable document

IEEE C37.111-1991 Pwr Sys Relay

Common Format for Transient Data Exchange (COMTRADE) for Power Systems

IEC TC 95

See also none

Status NWI submitted by USNC for IEC action

Source Anne O'Neill, Standards Dept. 5/18/94

(N) no comparable document

NWI ballot in IEC

IEEE 1158-1991 Substations

Recommended Practice for Determination of Power losses in HVDC Converter Stations

IEC SC22F

See also none

Status NWI submitted by USNC for IEC adoption

Source Anne O'Neill, Standards Dept. 5/18/94

(E) technically equivalent

technically equivalent

IEEE 300-1988 Nuc & Plasma Sc Soc

Test Procedures for Semiconductor Charged-Particle Detectors

IEC 333-1983 TC45

Test procedures for semiconductor charged-particle detectors

See also

Status IEEE stnd in revision

Source Lou Costrell, USTA TC45 5/18/94

Comparable IEEE/IEC standards
sorted by PES Technical Committees

(E) technically equivalent

technically equivalent

IEEE 301-1988 Nuc. & Plasma Sc Soc

Test Procedures for Amplifiers and Preamplifiers Used with Detectors of Ionizing Radiation

IEC 1151-1992 TC45

Nuclear Instrumentation -- Amplifiers and preamplifiers used with detectors of ionizing radiation -- Test procedures

See also

Status IEEE stnd in revision

Source Lou Costrell 5/18/94

(E) technically equivalent

technically equivalent

IEEE 325-1986 Nuc & Plasma Sc Soc

Test Procedures for Germanium Gamma-Ray Detectors

IEC 973-1992 TC 45

Test procedures for germanium gamma-ray detectors

See also

Status

Source Lou Costrell 5/18/94

(E) technically equivalent

technically equivalent

IEEE 398-1972 (R91) Nuc & Plasma Sc Soc

Test Procedures for photomultipliers and scintillation counting and glossary for scintillation counting

IEC 462-1974 TC 45

Test procedures for photomultiplier tubes for scintillation counting.

See also IEC 596

Status

Source Lou Costrell 5/18/94

(E) technically equivalent

technically equivalent

IEEE 398-1972 (R91) Nuc & Plasma Sc Soc

Test Procedures for photomultipliers and scintillation counting and glossary for scintillation counting

IEC 596-1978 TC 45

Definitions of test method terms for semiconductor radiation detectors and scintillation counting.

See also IEC 462

Status

Source Lou Costrell 5/18/94

(E) technically equivalent

technically equivalent

IEEE 759 -(R91) Nuc & Plasma Sc Soc

Test procedures for semiconductor X-ray energy spectrometers

IEC 759-1983 TC 45

Test procedures for semiconductor X-ray energy spectrometers Amendment 1-1991

See also

Status

Source Lou Costrell 5/18/94

(E) technically equivalent

technically equivalent

IEEE 960-1989 Nuc & Plasma Sc Soc

FASTBUS -- Modular highspeed data acquisition and control system

IEC 935-1990 TC 45

FASTBUS -- Modular highspeed data acquisition system

See also

Status

Source Lou Costrell 5/18/94

(E) technically equivalent

technically equivalent

IEEE 1177-1993 Nuc & Plasma Sc Soc

FASTBUS -- Modular highspeed data acquisition and control system

IEC 1052-1991 TC 45

FASTBUS -- Standard routines

See also

Status

Source Lou Costrell 5/18/94

(E) technically equivalent

technically equivalent

IEEE ASC N42.4-(R91) Radiation Instrumentation Soc

High-voltage connectors used in nuclear instruments

IEC 498 -1975 TC 45

High-voltage coaxial connectors used in nuclear instrumentation

See also

Status

Source Lou Costrell 5/18/94

Comparable IEEE/IEC standards
sorted by PES Technical Committees

(E) technically equivalent

technically equivalent

IEEE ASC N42.13-1986 Radiation Instrumentation Soc

Calibration and Usage of "Dose Calibrator" Ionization Chambers for the Assay of Radionuclides

IEC 1145 -1992 TC 45

Calibration and usage of ionization chamber systems for assay of radionuclides

See also

Status

Source Lou Costrell 5/18/94

(P) partly equivalent or corresponding

IEEE 323-1984 (R'90) Nuc Pwr

Qualifying Class 1E Equipment for Nuclear Power Generating Stations

IEC 780 SC 45A

Qualification of electrical items of the safety system for nuclear power generating stations

See also

Status

Source Salvatore P. Carfango 5/18/94

(P) partly equivalent or corresponding

IEEE 344-1987 (R'93) Nuc Pwr

Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations

IEC 980-1989 SC45A

Recommended practices for seismic qualification of elecgtrical equipment of the safety system for nuclear generating stations

See also

Status

Source Salvatore P. Carfagno 5/18/94

(P) partly equivalent or corresponding

detailed comments available

IEEE C57.12.01-1989 Transformers

General Requirements for Dry-Type Liquid Distribution and Power Transformers Inc Solid cast &/or Resin- Encapsulated Windings

IEC 76 -1 -1976 TC14

Power Transformers. Part 1: General

See also C57.12.00 - 1993

Status

Source Subhas Sarkar, member 5/18/94

(P) partly equivalent or corresponding

detailed comments available

IEEE C57.12.00-1993 Transformers

General Requirements for Liquid Immersed Distribution, Power and Regulating Transformers I

IEC 76 -1 -1976 TC14

Power Transformers. Part 1: General

See also C57.12.01 - 1989

Status

Source Subhas Sarkar, member 5/18/94

(P) partly equivalent or corresponding

detailed comments available

IEEE C57.96 -- 1989 Transformers

Guide for Loading Dry-Type Distribution and Power Transformers

IEC 76-2 -1976 TC14

Power Transformers. Part 2: Temperature Rise

See also C57.12.01 - 1989

Status

Source Subhas Sarkar, member 5/18/94

(P) partly equivalent or corresponding

IEC and ANSI C37 organization vary a lot

IEEE C37.04 Switchgear

Rating Structure for AC High-Voltage Circuit Breakers Rated on a symmetrical Current Basis

IEC 56 -1987 SC 17A

High-voltage alternating-current circuit-breakers

See also C37.09, C37.06, IEEE 694 and C37.100

Status the 3 C standards are in revision

Source Kirk Smith 5/18/94

(P) partly equivalent or corresponding

IEC and ANSI C37 organization vary a lot

IEEE C37.09 Switchgear

Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis

IEC 56-1987 SC 17A

High-voltage alternating-current circuit-breakers

See also C37.04, C37.06, IEC 694 and C37.100

Status the 3 C standards are in revision

Source Kirk Smith 5/18/94

Comparable IEEE/IEC standards
sorted by PES Technical Committees

(P) partly equivalent or corresponding

IEC and ANSI C37 organization vary a lot

IEEE C37.100-1992 Switchgear

Definitions for Power Switchgear

IEC 694-1980 SC 17A

Common clauses for high-voltage alternating current circuit-breakers

See also C37.04, C37.06, C37.09 IEEE 56

Status

Source Kirk Smith 5/18/94

(P) partly equivalent or corresponding

IEEE 80-(R 91) Substations

Guide for Safety in AC substation Grounding

IEC 364- series TC 64

Electrical Installation of Buildings

See also

Status

Source Don Rogers, IEEE SC member 6/20/94

(N) no comparable document

IEEE 48-1990 Insul Condctr

Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminations

IEC

See also

Status

Source Don Rogers, IEEE SC member 5/18/94

(N) no comparable document

IEEE 1119 -(R 93) Substations

Guide for Fence Safety Clearances in Electric-Supply Stations

IEC

See also

Status

Source Don Rogers, IEEE SC member 5/18/94

(P) partly equivalent or corresponding

IEEE C57.13 -1993 Transformers

Requirements for Instrument Transformers

IEC 185 - 1987 TC38

Current Transformers

See also IEC 186

Status

Source Don Rogers, IEEE SC member 5/18/94

(P) partly equivalent or corresponding

IEEE C57.13 -1993 Transformers

Requirements for Instrument Transformers

IEC 186 - 1987 TC38

Voltage Transformers

See also IEC 185

Status

Source Don Rogers, IEEE SC member 5/18/94

(P) partly equivalent or corresponding

See Oct. 92 Transactions on Power Delivery 92-WM 230-3 PWRD

IEEE C62.11 Surge Prot Dev

Metal-Oxide Surge Arresters for AC Power Circuits

IEC 99 -4 TC 37

Surge arresters- Prt 4: Metal oxide surge arresters without gaps for a.c. systems

See also

Status

Source John Posey 6/2/94

(E) technically equivalent

IEEE C37.122-1983 Substations

Gas Insulated Substations

IEC 517 -1990 SC 17C

Gas-insulated metal-enclosed switchgear for related volatges of 72.5 kv and above

See also

Status

Source Don Rogers, IEEE SC member 5/18/94

(P) partly equivalent or corresponding

feasibility of harmonization in study

IEEE C37.34-R 87 Switchgear

Standard Test Code for High Voltage Air Switches

IEC 694-1980 SC 17A

Common clauses for high-voltage alternating current circuit-breakers

See also IEC 129

Status

Source Luther Kolarik, EPRI 6/2/94

Comparable IEEE/IEC standards
sorted by PES Technical Committees

(R) related

feasibility of harmonization in study

IEEE C37.34-R 87 Switchgear

Standard Test Code for High Voltage Air Switches

IEC 129-1984 SC 17A

Alternating current disconnectors and earthing switches

See also IEC 693

Status

Source Luther Kolarik, EPRI 6/2/94

(P) partly equivalent or corresponding

See Oct. 92 Transactions on Power Delivery 92-WM 230-3 PWRD

IEEE C62.1- 1989 Surge Prot Dev

Standard for Gapped Silicon-Carbide Surge Arresters for AC Power Circuits

IEC 99-1 TC 37

Surge arresters - Part 1: Non-linear resistor type gapped arresters for a.c. systems

See also

Status

Source John Posey 6/2/94

(P) partly equivalent or corresponding

IEEE C62.22- 1991 Surge Prot Dev

Guide for the Application of Metal-Oxide Surge Arresters for Alternating Current Systems

IEC DIS 37 TC 37

Surge arresters application guide

See also

Status

Source John Posey, editor of English 6/2/94

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