MEETING MINUTES

IEEE/PES TRANSFORMERS COMMITTEE MEETING

MARCH 31, 1993

PORTLAND, OR

IEEE/PES TRANSFORMERS COMMITTEE MEETING
PORTLAND, OR
MARCH 31, 1993

ATTENDANCE SUMMARY

MEMBERS PRESENT:

E. J. Adolphson
B. F. Allen
R. Allustiarti
M. S. Altman
J. C. Arnold
J. Aubin
T. R. Balgie
R. A. Bancroft
R. L. Barker
D. A. Barnard
W. B. Binder
W. E. Boettger
J. V. Bonucchi
J. D. Borst
J. L. Corkran
J. C. Crouse
V. Dahinden
J. N. Davis
T. Diamantis
D. H. Douglas
R. F. Dudley
J. A. Ebert
F. E. Elliott
D. J. Fallon
H. G. Fischer
D. L. Galloway
A. A. Ghafourian
R. L. Grubb
F. Gryszkiewicz
K. S. Hanus
J. H. Harlow
W. R. Henning
K. R. Highton
P. J. Hopkinson
J. W. Howard
E. Howells
P. Iijima
A. J. Jonnatti
R. D. Jordan
E. Kallaur
J. J. Kelly
S. P. Kennedy
W. N. Kennedy
J. P. Kinney, Jr.
A. D. Kline
J. G. Lackey
J. P. Lazar
F. A. Lewis
H. F. Light
S. Lindgren
L. A. Lowdermilk
D. L. Lowe
D. S. Lyon
W. A. Maguire
J. W. Matthews
J. W. McGill
C. J. McMillen
W. J. McNutt
C. P. McShane
C. K. Miller
M. C. Mingoia
H. R. Moore
W. E. Morehart
D. H. Mulkey
C. R. Murray
W. H. Mutschler, Jr.
C. G. Niemann
E. T. Norton
P. E. Orehek
G. A. Pavia
B. K. Patel
W. F. Patterson
J. M. Patton
P. A. Payne
H. A. Pearce
J. D. Perco
M. D. Perkins
V. Q. Pham
L. W. Pierce
R. L. Plaster
D. W. Platts
P. Riffon
R. B. Robertson
J. R. Rossetti
W. E. Saxon
D. N. Sharma
H. J. Sim
L. R. Smith
S. D. Smith
W. W. Stein
J. C. Sullivan
L. A. Tauber
J. B. Templeton
A. M. Teplitzky
V. Thenappan
J. C. Thompson
R. W. Thompson
T. P. Traub
G. H. Vaillancourt
R. A. Veitch
L. B. Wagenaar
B. H. Ward
R. J. Whearty
W. E. Wrenn

MEMBERS ABSENT:

D. J. Allan
D. L. Basel
C. V. Brown
M. Cambre
D. J. Cash
K. Edwards
J. A. Fleeman
J. M. Frank
M. Frydman
D. W. Gerlach
D. A. Gillies
R. S. Girgis
F. W. Heinrichs
P. J. Hoefler
R. H. Hollister
J. Hunt
C. P. Kappeler
R. I. Lowe
K. T. Massouda
S. P. Mehta
C. Millian
R. E. Minkwitz, Sr.
M. I. Mitelman
R. J. Musil
S. H. Osborn
D. A. Peters
C. T. Raymond
C. A. Robbins
M. P. Sampat
L. J. Savio
R. W. Scheu
R. J. Stahara
L. R. Stensland
R. W. Stoner
D. W. Sundin
D. S. Takach
J. A. Thompson
D. E. Truax
W. B. Uhl
D. W. Whitley
A. L. Wilks
C. W. Williams, Jr.
J. G. Wood

GUESTS PRESENT

D. Anderegg
G. Andersen
J. Antweiler
M. P. Austin
D. E. Ayers
B. L. Beaster
D. L. Billings
J. L. Brown
A. Cancino
W. J. Carter
R. E. Chadwick
J. M. Christini
D. Chu
C. C. Clairborne
A. Delgado
R. Fausch
P. T. Feghali
G. E. Forrest
B. I. Forsyth
M. A. Franchek
R. Garcia
J. S. Garza
J. P. Gibeault
D. F. Goodwin
R. L. Grunert
E. Hanique
N. W. Hansen
J. W. Harley
T. J. Haupert
G. E. Henry III
T. L. Holdway
R. Hollingsworth
E. Hutter
L. Koga
S. Kostyal
B. Kumar
M. Y. Lau
J. E. Long
R. G. Loss
A. J. Martinez
C. L. Moore
L. Napoli
R. C. Nordman
D. E. Parr
L. C. Pearson
B. Poulin
G. Preininger
R. L. Provost
R. I. Psyck
J. Puri
G. J. Reitter
D. Rolling
A. Salem
D. M. Shah
R. W. Simpson, Jr.
P. Singh
J. E. Smith
J. E. Smith
T. H. Stewart
T. Thornton
E. Trummer
J. Vaschak
R. E. Wakeam
K. Weidmann
F. E. Willett
H. J. Windisch
E. Woolfort

TRANSFORMERS COMMITTEE

IEEE/PES TRANSFORMERS COMMITTEE MEETING
WEDNESDAY, MARCH 31, 1993

Chairman: J. D. Borst Vice Chairman: J. H. Harlow

Secretary: W. B. Binder, Jr.

1.0 CHAIRMAN'S REMARKS AND ANNOUNCEMENTS - J. D. BORST

IEEE/PES TRANSFORMERS COMMITTEE
Chairman's Report
1993 Spring Committee Meeting

1.1 IEEE/PES Executive Board

The IEEE PES Executive Board held a special joint meeting with the PES Technical Council (TC) on Sunday, January 31 at the 1993 Winter Power Meeting (WPM) in Columbus, Ohio; PES President John Pope presided.

1. Standards Vision

At the October, 1992 meeting of the Executive Board, a recommendation entitled "Standards-Vision for the Future" was presented and approved (Subcommittee Chairman each have a copy). President Pope provided an overview and significant discussion ensued; highlights follow:

a. Assumptions/Strengths of IEEE
- International standards gaining in importance
- IEEE is an international body
- IEEE International membership growing
- IEC is predominant international standards
- IEC recognizes value of IEEE technical expertise
- IEEE is perceived as a developer of US Standards
- For IEEE/PES to maintain/have an influence in international standards, changes are necessary

b. Recommendations for PES

Enhance international reputation by shedding image of national standards developer (Note: Included was a suggestion to sever co-secretariat links to ANSI Standards; such a move would impact C57 and has not been initiated by your officers).

- Develop better relationships with other standards organizations
- Develop world class standards via improved standards development processes

c. Activities

- A meeting was held in December among various standards organizations (IEEE, ANSI, NEMA, EEI, IEC) to initiate dialogue
- The US IEC National Committee will provide an informational session at Summer Power Meeting (SPM)

During discussion, several TC members (including your chairman) raised issues of concern:

- PES current constituency for standards development is US/North American
- Consideration is currently given to harmonization with IEC and could receive greater emphasis
- Resolution of North American/EC differences could in some instances dilute requirements
- The need for US/North American Standards is a practical reality; severing/reducing ties with ANSI could create a void and result in loss of support for IEEE standards development activities
- Lack of user support for global standards development
- Legal implications of the consensus process - ANSI vs IEEE vs IEC
- Acceptability of IEEE or IEC standards vs ANSI standards in the US

Dialogue on this topic continues; implementation details are yet to be determined so impact is difficult to assess. (Note: the Transformers Committee will continue to consider relevant IEC/International input while still meeting the needs of our North American Constituency.)

2. 1992 SPM

The 1997 SPM will be held at a yet to be named location in Europe to enhance PES International image. Lower support/attendance by North American membership is likely, which may change the focus of the meeting. The TC had previously indicated that they would not meet at that meeting; this position was later changed. Technical Committees were encouraged to support the meeting.

3. TC Organization

At the request of President Pope, TC Chairman, Jerry Hagge, developed a preliminary proposal to reorganize the TC by departments; as proposed, the Transformer Committee would reside in the Substations Department. However, this is all very preliminary; neither the objectives of the reorganization nor the value-added of the department level are well defined.

1.0 CHAIRMAN'S REMARKS AND ANNOUNCEMENTS (Cont'd)

4. Technical Committee Issues

Issues identified include:

- Ongoing struggle for resources (time/money) to support standards development
- Publication costs and limitations (paper quotas)
- Application of electronic technologies to administrative tasks

1.2 PES Technical Council

The TC held its regular meeting on Tuesday evening, February 2nd at the 1993 WPM with Chairman Jerry Hagge presiding; highlights follow:

1. Standards Vision

Additional discussion occurred concerning the Executive Board position on "Standards - Vision for the Future' (See A1)

2. TC Organization

Chairman Hagge solicited input on improvements to the TC organization (see A3)

3. 1997 SPM

As stated above (see A2), the TC reversed its previous decision and will plan to meet at the 1997 SPM in Europe. It was also noted that the 1994 SPM (San Francisco) intends to emphasize international issues.

4. 1993 TC Goals

Although basic goals have not changed, Chairman expressed that 1993 emphasis would include:

a) To clarify, streamline, and promote the standards making process in accordance with the approved "Standards - Vision for the Future'.

b) Revision and updating of the technical paper review and publication policies (including electronic publishing) to enhance member service.

c) Coordinate the Executive Board Task Force and the Technical Council to review and make recommendations on updating and improving the Technical Council organization and liaison system.

1.0 CHAIRMAN'S REMARKS AND ANNOUNCEMENTS (Cont'd)

5. Succession Planning

The current rotational process for TC Committee assignments provides limited continuity. Alternate methods are under consideration. Also, the potential benefits of formal orientation and checklists were discussed.

6. TC Awards Committee

Chairman Don Russell urged higher utilization of available awards.

7. TC Publications Committee

Vice Chairman Jim Harlow will report the details from this committee. It was noted that the allocation of paper quotas to Technical Committees will now be based on a common acceptance percentage rather than a historical number.

8. TC Standards Coordinating Committee

Standards Subcommittee Chairman George Vaillancourt will report the details from this committee. Points of interest include:

a) A memorandum of understanding has been reached by IEEE, NEMA and ANSI regarding administration of C57. L. Napoli was asked to provide a copy to us.

b) Scope overlap with PSIM on the revision of C62 (Field Testing Guide) was identified; greater coordination will be required.

c) SPD has agreed to address surge protection on LV systems; joint coordination activities will need to be defined.

9. Transformers Committee Report to TC

A copy of the report submitted is attached.

John D. Borst Chairman, PES Transformers Committee

1.0 CHAIRMAN'S REMARKS AND ANNOUNCEMENTS (Cont'd)

IEEE/PES TRANSFORMERS COMMITTEE
Report to the IEEE/PES Technical Council
1993 Winter Power Meeting
Columbus, Ohio February 2, 1993

COMMITTEE MEETINGS

The most recent meeting of the Transformers Committee was held October 19-21, 1992 in Cleveland, Ohio. The meeting was attended by 241 members and guests plus 39 spouses. The luncheon speaker was Dr. Phillip Abel of NASA's Lewis Research Center.
Future meetings are scheduled as follows:

Date	Location
March 28-31, 1993	Portland, Oregon
Oct. 31 -Nov. 3, 1993	St. Petersburg
March 20-23, 1994	Dallas/Ft. Worth
Sept. 24-28, 1994	Milwaukee, Wisconsin
Spring 1995	Kansas City, Missouri
November 1995	Boston, Massachusetts
Spring 1996	San Francisco, California

Seven (7) new members were approved at the meeting bringing the total Committee membership to 161 of whom 13 are classified Emeritus.

Due to the burden of rising costs, the Committee agreed to fund the expense of producing and mailing the Committee' meeting minutes; this will be included in the registration expense.

TRANSFORMERS STANDARDS AND COORDINATION ACTIVITIES

A status report of all transformer standards or projects sorted by responsible subcommittee was provided to the membership.

Concerning the primary transformer standards (C57-12.00 and C57.12.90), the Standards Board approved various projects submitted but rejected revision of the complete documents on the basis that the entire documents had not been submitted for ballot. Although this is a change from past practice, the balloting will potentially provide input for future revisions.

Mr. Luigi Napoli, IEEE Standards Staff, gave an overview of the standards process in a Seminar for Working Group and Subcommittee Chairs at the Cleveland meeting.

1.0 CHAIRMAN'S REMARKS AND ANNOUNCEMENTS (Cont'd)

TECHNICAL PAPERS

1992 Summer Power Meeting - Seattle - July 12-16, 1992. Six (6) papers were presented at two sessions at the Summer Power Meeting, July 15 and 16, 1992.

1993 Winter Power Meeting - Columbus - January 31 -February 4, 1993. Twenty-five (25) papers were submitted for review by the Transformers Committee. Of these, six are scheduled for presentation at the meeting. One additional paper has been approved for presentation at the Transformers Committee meeting in Portland (March, 1993).

John D. Borst
Chairman

2.0 APPROVAL OF MINUTES OF OCTOBER 21, 1992 - J. D. BORST

The minutes of the Cleveland meeting were approved as published.

3.0 VICE CHAIRMAN'S REPORT - J. H. HARLOW

IEEE PES TRANSFORMERS COMMITTEE
VICE CHAIRMAN'S REPORT
MARCH 29, 1993

Reports of PES Committees to which the Vice Chairman serves as liaison. All meetings held in conjunction with 1993 Winter Power Meeting, Columbus, OH, Feb. 1-2, 1993.

3.1 Publications Committee

1. Technical Committee Quotas. A new system for allowed paper acceptance rate will go into effect for the 1993 SPM. Instead of an individual committee quota based on historical trends, each committee will be allowed the same percentage acceptance rate. For the 1993 SPM, the PES can accept 210 of 475 papers submitted. All technical committees may therefore accept up to 44% of the papers received. This change of policy would not have changed the Transformers Committee allowed papers for the 1993 WPM (7 papers, 28%).

2. We received 11 papers for review for the 1993 SPM. At 44%, we may accept 5 papers for that meeting.

3. With the notable exception of the 1993 SPM, there is the consensus that the recent allowed acceptance rates have been too low. In an effort to return to the desired target of 45% to 50% acceptance, two changes are planned.

   a) Starting 1994 SPM, reduce the number of free pages in a paper from 7 to 6. Note: An author may submit a paper of any length, but, if accepted, the author will pay $110 per page for each page over six.

   b) Increase the total PES Transactions budget from the present 4500 pages to 5000 pages by 1995 or before.

4. The publications policy for the T & D Conference, April 10-15, 1994 is as in the past in that there will be "Transactions" and "Conference" papers. A paper submitted to be "Transactions" will be reviewed as such with a committee quota assigned and no opportunity for step-down to "Conference" if not accepted for "Transactions." Papers submitted as "Conference" may be accepted without quota limits.

3.2 Technical Sessions Improvement Committee

1. Each author will be asked at the author's breakfast of the 1993 SPM if he would like to receive an anonymous critique of his presentation. For those who agree, someone in the audience (not the session chairman) will prepare the evaluation for sending to the author through IEEE headquarters office.

3.0 VICE CHAIRMAN'S REPORT (Cont'd)

3.3 Organization and Procedures Committee

1. The Substations Committee has plans to consolidate standards on seismic requirements for all major apparatus. Is this infringing on the scope of the individual TC's? How does Transformers Committee wish to respond?

2. The "IEEE/PES Technical Council Organization and Procedures Manual July 1992" was distributed in November 1992 to Technical Committee officers. Copies have been distributed to members of the Administrative Subcommittee. I am working to incorporate the Transformers Committee Operating Manual into the pattern and dictates of the PES Manual.

3.4 Technical Paper Coordination

1. 1993 Winter Power Meeting, Columbus, OH, Feb. 1-4, 1993. Six papers were presented at two sessions. The seventh paper from the 1993 WPM quota will be presented at the Transformers Committee meeting, March 30, 1993.

2. 1993 Summer Power Meeting. Eleven papers were submitted for review by the Transformers Committee, of which 5 may be approved for presentation.

3.5 Future Meetings Schedule

Oct 31-Nov 3, 1993	St.Petersburg Beach, FL	Jim Harlow
March 20-23, 1994	Dallas, TX	Ken Hanus
Sept 24-28, 1994	Milwaukee, WI	Sam Mehta
Spring 1995	Kansas City, MO	Henry Windisch
Nov 5-9, 1995	Boston, MA	Ken Skinger
Spring 1996	San Francisco, CA	John Wood

Respectfully submitted,
J. H. Harlow
Vice Chairman

4.0 ADMINISTRATIVE SUBCOMMITTEE - J. D. BORST

IEEE/PES TRANSFORMERS COMMITTEE
ADMINISTRATIVE SUBCOMMITTEE MEETING MINUTES
March 29, 1993
Portland, Oregon

4.1 Introduction of Members and Guests

Chairman Borst dispensed with introductions and called the meeting to order at 6:30 p.m. in the Halsey/Weidler Rooms of the Red Lion LLoyd Center Hotel.

The following members of the Subcommittee were present:

W. B. Binder, Jr.	J. D. Borst	J. N. Davis
D. H. Douglas	J. H. Harlow	J. W. Matthews
W. Patterson	H. A. Pearce	P. E. Orehek
L. A. Tauber	J. C. Thompson	J. B. Templeton
G. H. Vaillancourt	R. A. Veitch	L. B. Wagenaar

Guests present:

Ken Hanus - Dallas Host

4.2 Approval of the Cleveland Meeting Minutes

There were no additions or corrections to the minutes. 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

Portland Host - L. A. Tauber reported that there were 259 registrations, which included 12 pre-paid no-shows plus 57 spouses. 124 are scheduled for the Tuesday luncheon. Mr. Richard Perless of BPA will speak. 153 are scheduled for the Tuesday evening social at the Oregon Museum of Science and Industry.

St. Petersburg Host - J. H. Harlow announced that the meeting scheduled for October 31 - November 3, 1993 will be held at the Trade Winds Hotel on St. Petersburg Beach. Rooms are $105 per night plus 10% tax. The Tuesday luncheon speaker will be Mr. Andy Hines, retired CEO of Florida Progress Corporation. Mr. Harlow is considering a Saturday evening function.

Dallas meeting - Mr. Hanus reported that the meeting will be held at the Grand Kempinski Hotel.

4.0 ADMINISTRATIVE SUBCOMMITTEE (Cont'd)

4.5 Standards Subcommittee - G. Vaillancourt

Standards Status - Mr. Vaillancourt reviewed the attachments to his report which have been improved. A separate page or pages will be incorporated into the main committee minutes after each Subcommittee report showing the current status of each Subcommittee's assignments. These pages are currently Attachment 1 of the Standards Report. Attachment 2 is a list of all standards for which the Committee is responsible, sorted by standard number. This attachment will continue to be included as an appendix to the Transformers Committee minutes.

Chairman Borst next reported on related standards matters. Progress is being made with regard to the relationship of IEEE to the C57 Committee. A memorandum of understanding now exists between NEMA and IEEE. A summary of the memorandum will accompany these minutes.

The IEEE/PES Substations Committee wants to discuss replacement of the Transformers Committee's Seismic Guide (C57.114) with a more comprehensive revision of IEEE 693.

NEMA TR-1 will be republished. Parts which have been picked up elsewhere won't be republished.

NEMA is proceeding with efforts to satisfy the requirements of the Energy Policy Act. Among the issues being addressed is the energy efficiency of distribution transformers. NEMA is considering writing a loss evaluation guide for distribution transformers. CSA has also established loss limits for distribution transformers. Copies of the CSA document were distributed to the Chairmen of the Distribution Transformers, Dry-Type Transformers, and Performance Characteristics Subcommittees.

Mr. Vaillancourt then discussed Attachments 3 and 4 to his report. These attachments are appendices to the main committee minutes.

Mr. Vaillancourt reviewed the status of C57.12.90. The ballot on this standard was successful and completed in time for the standard to be approved at the March 18, 1993 Standards Board meeting. A late ballot received after the document was submitted to the Standards Board was assigned to the Insulation Life Subcommittee.

Balloting conducted on C57.12.00 has closed. Two negatives were received. Both will be assigned to members of the Task Force to attempt to resolve.

Mr. Vaillancourt then covered the balance of his report including the events at the PES Standards Coordinating Committee meeting at the WPM.

- IEEE 62 is undergoing revision which appears to cover areas for which the Transformers Committee is responsible. An Ad Hoc task force was formed to review the document and offer material for response by the Chairman to the Sponsoring Committee (PSIM) objecting to use of or duplication of parts of

Transformers Committee areas. Procedural problems and not technical issues are involved. Messrs Veitch, Wagenaar, Kennedy, Matthews, and Binder will review the document and provide feedback to Mr. Vaillancourt by the end of May.

- The recommendation by the Transformers Committee which resulted from Mr. Olin Compton's motion at the April 1, 1992 meeting to oppose reaffirmation of a standard without balloting did not receive much support from the other members of the PES/SCC.

- A discussion by the members of Adsubcom was conducted on the memorandum of understanding between NEMA, ANSI, and IEEE regarding C57 standards. A letter from Andrew Salem summarizing the understanding will be incorporated into these minutes.

4.6 Status of IEEE Standards - L. Napoli/A. Salem

Mr. Vaillancourt reported for the IEEE Staff that a new IEEE Standards By-Laws and a Standards Operating Manual has replaced the IEEE Standards Manual.

Three standards kits replace the Standards Submittal Kit. One is a starter kit containing a PAR authorization form, one kit is a post-project approval kit containing a standards style manual, and one kit is a standard board submittal kit containing the submittal form dated September 1992.

IEEE ballot services are only offered for sponsor ballots. A second notice for ballot return will no longer be sent.

There is a procedure to follow to use, circulate, or reproduce IEC copyrighted material. Some discussion was conducted on how to follow this procedure. George will bring up the question at the next SCC meeting.

John Davis expressed concern over a lack of coordination with the C12 Committee during the review and reaffirmation of C12.11. It will be necessary to find if IEEE has a delegation to the C12 Committee.

Correspondence from Luigi Napoli on the status of the IEEE Standards Department is included below:

PES WINTER MEETING
Standards Department Update
February 1993
Columbus, OH

What was once known as the "Submittal Kit" has been separated into three "Standards Kits" which will be distributed at various stages of standards development. The IEEE Standards Starter Kit will include a Standards Board Bylaws and Operations Manual, PAR form, Service brochure, Standards Bearer, and catalog. The Post Project Approval Kit will include the NesCom letter, Style Manual, Ballot Service information, and Leadership Training information. The Standards Board Submittal Kit will include the Submittal form and information on the Standards Press, Learning Tools, and Standards Seminars On-Site.

The Submittal form has been revised (9/92). Old forms will not be accepted by the Standards Board.

The Service Brochure is new and available here at the Power Meeting (will also be mailed to all standards liaisons).

The new IEEE Standards Style Manual was published in August 1992.

The IEEE Standards Manual was revised and will now be two booklets: the IEEE Standards Board Bylaws and Operations Manual.

Ballot Service Update - The balloting service is for SPONSOR (Sponsor generally means Main Committee) level ballots ONLY. We do not have the resources to ballot any sub-groups.

New ballot forms for Sponsor ballots: The FOR ACTION form is read by an optical mark reader, the actual form must be mailed in, faxes will ONLY be accepted from outside the U.S (the actual must still be returned by mail). The Coordination Verification and For Information forms have also been revised to reflect that Coordination and For Information are not "ballots" but a "review." Comments, however, are treated in the same manner as a ballot.

If balloting is delegated to a Subcommittee by the Sponsor, proof of this delegation must be submitted for the Standards Board to approve the ballot. If the Subcommittee wishes to utilize the Standards Department Balloting Service, a roster of the group must be submitted. Classifications (Subcommittee must be balanced), IEEE numbers, and distinction between voting members, liaisons, etc., MUST also be provided for the ballot to be valid. Refer to the Ballot Service Memo in the second kit.

A second notice for balloting will no longer be sent. This was not found to be useful. A summary of non-respondents will be sent to the Sponsor 10 days prior to the ballot close date.

Each Sponsor should send an annual update of the Main Committee roster with classifications, IEEE numbers, and voting member status to keep our balloting database current and prevent any complications that may occur due to an inaccurate mailing list.

Some Committees may choose to have the members elect which standards they wish to vote on. This self limit may reduce the number of non-respondents. The T&D Committee does this and supplies the Standards Dept. with a list of which members should be in the balloting group of each particular standard.

Please use the latest copyright statement (Style Manual) on all drafts.

IEC copy agreement: The IEC has agreed to allow selective copying of IEC publications for the SOLE purpose of standards development. A statement will be supplied later that must be included on all copies of IEC standards.

New program: The Standards Press, in coordination with TAB and the IEC, is working towards the development of a program to publish and disseminate Emerging Technical Practices and Procedures papers.

To clarify a misunderstanding: It is NOT required that every Working Group and Subcommittee send a copy of their minutes to the Standards Department. Only a yearly standards status report (such as the report the Standards Coordinator supplies at the Main Committee meeting) is required from the Sponsor, minutes are accepted in lieu of the report. This will help reduce mailing and reproduction costs for many groups. The new Operations Manual addresses this in clause 4.1.3 Annual Report of the Sponsor, The Sponsor shall submit an annual status report on its standards group(s) to the IEEE Standards Board.

Bulletin Board: The Bulletin Board is being completely revised; new hardware, new software, new modems. The Bulletin Board is available to every working group or committee interested in setting up a work space for projects, draft standards, electronic mail, etc.. The Board is accessible via Internet or modem, and allows for multiple users at any one time. The system will be further improved with more features added through the year. Anyone interested in using the Bulletin Board should contact Jay Iorio 908-562-3837.

Please feel free to contact me if you have any questions. Thank you.

Luigi Napoli 908-562-3812

4.0 ADMINISTRATIVE SUBCOMMITTEE (Cont'd)

Balloting Service

The IEEE Standards Department will assist you in conducting letter ballots for your draft documents at the sponsor committee level.

You provide:

1) Two clear, single-sided copies of the draft on 8 1/2 X 11 paper.

2) A brief cover letter to the balloters explaining what the ballot is for and any other pertinent details.

3) Information regarding the following three groups of people:*

   a) Balloting Group
   - Name, address and telephone number.
   - IEEE member or affiliate number
   - Classification - sponsors are required to classify the relationship of each member of the balloting group relative to the scope of standards activity (e.g., user, producer, general interest, etc.). For further clarification, see Section 2.4 in the current IEEE Standards Manual.

   b) Names and addresses of Liaisons for Coordination as specified on the PAR.

   c) Names and addresses of Other Interested Parties.

   * Please note that if your groups were previously entered into our database, the sponsor should review and/or update them with the staff engineer or administrator.

We will:

1) Prepare a letter ballot form, which will be read by our optical mark reader.

2) Duplicate your draft for balloting.

3) Enter names, classifications and member or affiliate numbers into our database

4) Mail out the ballots and drafts, and record responses.

5) For people who have not responded to the ballot, we have found that phone call from the sponsor are most effective. Upon request on a one-time basis (3-5 day notice must be given), we will be happy to provide you with a list of non respondents w/phone numbers, a one page ballot summary and comment received to date, for follow up before the ballot closes.

6) Provide you with a full ballot summary when the ballot has closed, and give you copies of all comments for your review.

7) Update the ballot summary to reflect resolution of negative ballots when we receive a letter from the sponsor specifying who was contacted by letter/phone and the result.

8) Conduct a recirculation ballot when necessary.

For further information, contact Carol Buonfiglio at (908) 562-3834.

The following correspondence was received from the Standards Department to clarify the use of IEC documents in the development of IEEE standards:

To: John Borst/Georges Vaillancourt 24 March 1993

From: Luigi Napoli

Here is the latest news regarding IEC documents. The following statement must be included on all copies of IEC standards which are distributed to Working Group members:

> THIS COPY OF AN EXTRACT OR TOTAL IEC PUBLICATION IS TO BE USED SOLELY FOR THE PURPOSES OF FURTHER DEVELOPMENT OF INTERNATIONAL STANDARDS. IT MAY NOT BE OFFERED FOR FURTHER REPRODUCTION OR FOR SALE. THE COPYRIGHT RESTS WITH THE INTERNATIONAL ELECTROTECHNICAL COMMISSION.

In addition, we must notify the U.S. National Committee (USNC) of the IEC whenever an IEC document is copied for the purposes of standards development, Therefore, if any Working Groups wish to make a few copies of an IEC document for an approved standards project, they must use the above statement and notify me, so that I can in turn notify the USNC. The IEC wishes to limit the number of copies made and requests that the copies are kept to a strict minimum, clearly marked, and then destroyed (see attached letter).

I recently sent a status report on C57 standards. which you should have received by now. Feel free to contact me if you have any questions.

Thank you.

4.7 Status of ANSI C57 Committee - L. Savio

Mr. Savio was not present. There was no report.

4.0 ADMINISTRATIVE SUBCOMMITTEE (Cont'd)

4.8 Review of PES Awards Committee - R. A. Veitch

Mr. Veitch reminded the subcommittee chairmen that he relies on them to supply information on those who should receive awards. Those receiving recognition at the March 31, 1993 meeting of the committee are:

Harold Moore	Linden Pierce
David Takach	Jim Templeton
Bill Wrenn	

Mr. Veitch also reviewed developments at the most recent meeting of the PES Awards Committee held at the WPM. New policies on Prize Paper Awards and the results of questionnaires on Prize Standard Awards were reported.

Mr. Veitch's full report will be part of the Transformers Committee minutes.

4.9 Review of Technical Council Activities - J.D. Borst

Mr. Borst presented his report on the IEEE/PES Executive board meeting and the WPM meeting of Technical Council and a "Report to IEEE/PES Technical Council" which he presented at the meeting of Technical Council. Both of these reports were previously mailed to the members of the Administrative Subcommittee and will be incorporated into the Transformers Committee minutes.

4.10 Subcommittees' Activities Discussion - Subcommittee Chairmen

1. Audible Sound and Vibration - A. M. Teplitzky had nothing to report.

2. Bushing - L. B. Wagenaar reported that if the ballot on the Bushing Application Guide is successful in the Subcommittee, Fred Elliot may ballot the Transformers Committee before the next meeting.

3. Dielectric Tests - J. B. Templeton reported that Bertrand Poulin will be the new Chairman of the W. G. for Revision of Dielectric Tests and Mark Perkins is the new Chairman of the T. F. on Induced Tests. The Subcommittee has a new T. F. studying Insulation Coordination Between Transformer Insulation and Metal Oxide Surge Arresters. Robert Degeneff is Chairman.

4. Distribution Transformers - J. C. Thompson reported on a hold up with standards C57.12.23 and C57.12.26. The .23 standard may be held up due to copyright questions. The .26 standard has been balloted by ANSI. His full report to the Adsubcom is included below.

5. Dry-Type Transformers - W. Patterson reported problems in obtaining copies of CENELEC standards. His full report to the Adsubcom is included below.

4.0 ADMINISTRATIVE SUBCOMMITTEE (Cont'd)

6. HVDC Converter Transformers & Reactors - W. N. Kennedy had nothing to report.

7. Instrument Transformers - J. N. Davis indicated a proposal would be discussed at Tuesday's meeting to change the scope of the Subcommittee to include "field coupled" instrument transformers. The scope change will be reviewed by Adsubcom and must be approved by Technical Council if approved by the Subcommittee.

8. Insulating Fluids - H. A. Pearce had nothing to report.

9. Insulation Life - D. H. Douglas reported on the progress of balloting the High Temperature Insulation background paper. The procedure was clarified by Jim Harlow.

10. Performance Characteristics - J. W. Matthews expressed concerns over the use of IEC copyright materials. A procedure from IEEE Standards will be included in the minutes. He reported on the LTC seminar to be presented Tuesday afternoon. John also mentioned that there is a Task Force conducting a GSU failure survey. His full report to the Adsubcom is included below.

11. Underground Transformers & Network Protectors - P. E. Orehek had nothing to report. his full report to the Adsubcom is included below.

12. West Coast - L. A. Tauber reported having some trouble with the ballot of C57.93.

4.11 Vice Chairman's Report - J.H. Harlow

Mr. Harlow submitted his report on the activities of the Publications Committee, the Technical Sessions Improvement Committee, and the Organization and Procedures Committee. A copy of the report is included in the minutes of the Transformers Committee.

Mr. Harlow reviewed changes proposed to the Transformers Committee Operations Manual. He asked that the Adsubcom members review the draft of the Transformers Committee Operations and Procedures Manual and return comments to him by June 15, 1993. Any substantive changes to Subcommittee scopes will require approval of Adsubcom and the Organizations and Procedures Committee of PES.

4.12 Secretary's Report - W.B. Binder, Jr.

Membership Review - Mr. Binder reported on the following changes to the membership:

4.0 ADMINISTRATIVE SUBCOMMITTEE (Cont'd)

Resigned:
Joseph Pollit
R. E. Gearhart
O. R. Compton (Requested EM status, which was granted.)

Mr. Binder also reported on the passing of L. C. Aicher.

Prior to addition of new members at the Adsubcom Meeting membership stood at 143 Voting Members and 15 Emeritus Members. The membership is well balanced with 53 producers, 54 users, and 36 general interest members. The invitation list is 447 names.

New Member Applications Approval - The Adsubcom reviewed and approved the following new applications for membership:

John Crouse - G. E. - Rome, GA - Producer
Robert C. Degeneff - RPI - Troy, NY - General Interest
Dudley L. Galloway - ABB - Jefferson City, MO - Producer
William A. Maguire - Entergy Services, Inc - Little Rock, AR - User
C. Patrick McShane - Cooper Power Systems - Waukesha, WI - Producer
Charles R. Murray - Consultant - S. Boston, VA - General Interest
Mark D. Perkins - ABB - Muncie, IN - Producer
R. Leon Plaster - ABB - S. Boston, VA - Producer
Robert W. Thompson - PSI Energy - Plainfield, IN - User

Members of the Subcommittee were asked to review the invitation list to remove inactive names.

Mr. Binder asked each member of Adsubcom to submit their minutes within 60 days as a text file on floppy disk as they did for the Cleveland meeting. It was proposed that each subcommittee minutes follow the numbering format of the Chairman's Agenda. A request was made to facilitate searching the minutes by keeping the order of the reports the same from one set of minutes to the next. The Chairman agreed to continue this practice.

4.13 New Business

John Matthews passed on a request that the meetings of the Dielectric Tests, Insulation Life, and Performance Characteristics Subcommittees be rotated to avoid conflicting meetings at every third meeting of the Transformers Committee. The Chairman and the next host agreed to arrange this for the St. Petersburg meeting.

4.14 Adjourn

There being no further business, Mr. Borst adjourned the meeting at 10:06 p.m.

Respectfully submitted,
W. B. Binder, Secretary

5.0 TRANSFORMER STANDARDS - G. H. VAILLANCOURT

5.1 Transformers Standards and Coordination Activities

The status of all transformer standards or projects sorted by responsible subcommittees is reported in attachment 1. A box format is now used in the report to make it clearer. Also, the PUBDATE field has been moved close to the PAR_DATE field and the DRAFT_DATE field has been replaced by a new field called the REV_DUE_YEAR field. This should help to make sure that the revision work is completed on time or that an extension should be requested. The working group chair phone number is now also listed in the field WG_PHONE. The sheets in Attachment 1 are now separated according to the subcommittee name. The corresponding sheet(s) should now be made part of the appropriate subcommittee report and published with it in the Transformers Committee minutes. C57 standards that are not under the responsibility of the Transformers Committee, or are not assigned yet to a subcommittee, are listed under the Standards Subcommittee.

A new attachment 2 now replaces the old one which is contained in it. It contains roughly the same information as in attachment 1, except that in it, the standards are listed in numerical order instead of being grouped according to the subcommittee names. The old attachment 2 which gave a list of current status and changes under way on standards C57.12.00 and C57.12.90 is now automatically included in the new attachment 2. After approval of the revision of the main documents by the Standards Board, only the projects that are still active will continue to be listed in this attachment.

The most frequent cause of delay for getting a new standard approved by REVCOM is coordination that was not properly done. In order to help improve this situation, the acronyms of the bodies that have requested coordination are listed in attachments 1 and 2, and an index of these acronyms along with the name of the contact for each committee or society can be found in attachment 3. By calling these persons it should be possible to find out who in each committee has been appointed to look after coordination for each individual standard sponsored by the Transformers Committee. The original information on who requested coordination is normally listed in the approved PAR.

Attachment 4 is a report on coordination activities for documents that are sponsored by other committees or societies and for which the Transformers Committee has in the past requested coordination. It is intended that in future reports, attachment 1 and 4 will be combined together.

5.2 Ballot of C57.12.00 and C57.12.90

Since the Cleveland meeting, both documents have been balloted for revision at the committee level as requested by the Standards Board.

The results of the C57.12.90 ballot are as follows:

5.0 TRANSFORMER STANDARDS (Cont'd)

There were 143 people in the balloting group

123 of those were eligible to vote

We received:

98 affirmative votes
1 negative vote
3 abstention votes

102 ballots were returned (80% returned)

The ballot was therefore 98% affirmative.

One (1) more negative ballot was received more than one month after the ballot closing date and therefore, it did not count.

The valid negative vote has been withdrawn with the condition that the comments explaining the reason for it be circulated. This circulation has since been done by the IEEE Standards Department. All other comments received were also circulated except for comments with the invalid negative ballot that had not been received at the time.

Following the ballot of C57.12.90 there was enough time left to meet the February 5 deadline for submittal to the Standards Board. The document was submitted at the March 18 meeting and the revision was approved. The next step will be submittal to the ANSI C57 Committee which will be done by the IEEE Standards Department staff.

A ballot was also conducted on C57.12.00 but the closing date of March 18, did not allow that document to be submitted to the Standards Board at the March meeting.

5.3 Documents Submitted to the Standards Board

NESCOM 12/02/92 (PAR's)

C57.12.00 Final approval of PAR for consolidation
C57.12.90 Final approval of PAR for consolidation

5.0 TRANSFORMER STANDARDS (Cont'd)

REVCOM 12/02/92 (Standards)

C57.12.00	Extended to Dec. 1994
C57.12.90	Extended to Dec. 1994
C57.13	Revision not approved
Action:	- Sponsor must provide proof that the four negatives have been resolved. - Sponsor must prepare rebuttal to the comments received from the Switchgear Committee. C57.110 Reaffirmation approved NESCOM 03/16/93 (PAR's)

C57.130	Approved
P-1350	Approved ("Guide for Protection of Distribution Transformers with Emphasis on Secondary (Low-Voltage) Side Surges")

REVCOM 03/16/93 (Standards)

C57.12.56	Extended to March 1995
C57.12.90	Revision approved
C57.12.90b	Approved
C57.12.90c	Approved
C57.12.90e	Approved
C57.109	Revision approved

Standards Accepted by ANSI C57 Committee (Dec. 92)

C57.12.80, C57.13.1, C57.13.2, C57.15, C57.98, C57.100

Standards Being Balloted in ANSI C57 Committee

C57.12.23 (Held from distribution), C57.12.26, C57.12.60, C57.12.70, C57.19.101, C57.105, C57.117

5.4 Next Standards Board Meetings

Deadline for Submittal	Meeting Date
May 7, 1993	June 17, 1993
August 6, 1993	September 16, 1993
October 22, 1993	December 2, 1993

5.5 New Revised IEEE Manuals

Two IEEE documents have been revised and are now available to standards developers. These are the 1993 editions of the IEEE Standards Board Bylaws and the IEEE Standards Manual. Those interested in acquiring these documents can obtain them by contacting Terry deCourcelle, Manager, IEEE Standards Board Technical Support, at (908) 562-3807. Working group chairs should already have received them.

5.0 TRANSFORMER STANDARDS (Cont'd)

5.6 Standards Coordinating Committee Meeting

The Standards Coordinating Committee met, Monday, February 1, 1993, in Columbus, Ohio with eleven members and one guest present. The guest was Mr. John Borst, Chair of the Transformers Committee. Mr. Borst was present at the request of the Transformers Committee Standards Coordinator to participate in the discussion to evaluate standards development responsibility against technical committee scopes that was on the agenda. This topic was put on the agenda at the request of many standards coordinators, after Part I of a new version of IEEE-62 "Guide for Diagnostic Field Testing of Power Apparatus" had been circulated by the PSIM Committee. Part I covers power transformers, regulators, and reactors, and many standards coordinators feel that the content of the document that borrows largely from C57.12.90, is not within the scope of PSIM.

After much discussion on this matter, no clear-cut solution to this problem seemed to emerge. Joint sponsorship or utilization of at least one common member at the working group level were proposed as potential solutions. The standards coordinators or administrators of all technical committees were advised to closely review or scrutinize projects for overlaps, but no advice on what to do when this happens, were given.

Another point of concern to the Transformers Committee was also discussed. This is automatic reaffirmation of part of a document without balloting, when the rest of the document has been revised and balloted separately, as what we attempted to do with C57.12.00 and C57.12.90. The motion of Mr. Olin Compton regarding this was distributed to all those present. Most standards coordinators felt that procedure was perfectly correct and saved a lot of time and therefore it should remain. Although no vote was taken on the matter, nobody seemed to agree with Mr. Compton's motion that it be changed. Luigi Napoli remarked that some change has been made to the procedure now, but he did not say exactly what the new procedure was. However, as a matter of fact, the new 1993 revision of the IEEE Standards Operations Manual says in section 9.1.2:

> Supplements are additions to existing standards and may also contain minor corrections to the standard that are not extensive enough to justify a complete revision. Since a supplement is a revision, it shall be processed as a revision in accordance with the requirements of these procedures, including submission to the IEEE Standards Board.

The approved supplement may be printed as an insert for stock copies of the standard and will be incorporated into the standard at the next printing.

Normally two supplements are permitted before a standard shall be revised.

My personal reading of this is that it can still be done, but on no more than two supplements before the whole document needs to be balloted. In the case of C57.12.00 and C57.12.90, we submitted five and three at the same time and this was too many. In the future, a project should be submitted to the Standards Board as soon as it has been

balloted. It then will be up to the Standards Department to decide whether or not, or when to incorporate the change to the main document.

Mr. Luigi Napoli of the IEEE Standards Department reported that an agreement on the ANSI co-secretariat of Committees C37, C57, and C62 had been signed by both IEEE and NEMA. NEMA also agreed that the following standards be maintained by the IEEE Transformers Committee:

Standards: C57.12.10/.13/.20/.21/.22/.23/.24/.25/.26/.27/.40/.50/.51/.52/.55/ and .57

Many other subjects were also discussed at the Standards Coordinating Committee Meeting but they will not be covered here since they will be covered in the Transformers Committee Chairman and Vice-Chairman reports.

Respectfully submitted,
Georges H. Vaillancourt
Standards Subcommittee Chairman

6.0 RECOGNITION AND AWARDS - R. A. VEITCH

TRANSFORMERS COMMITTEE
RECOGNITION & AWARDS REPORT
March 31st, 1993

6.1 Certificates of Appreciation

I have noticed that there is sometimes a lack of understanding as to what positions are eligible for Certificates of Appreciation. As a result, I reviewed a set of guidelines issued in October, 1989, by S. S. Kershaw, Chairman, PES Awards Committee. The guidelines cover the entire PES organizational structure, therefore, I have selected only those guidelines applicable to the Technical Committees.

Certificates of Appreciation are normally provided for the following retiring positions:
- Committee Officers
- Subcommittee Chairmen
- Working Group Chairmen

It further states, "If the officers of a committee have a normal line of progression, such as Secretary, Vice-Chairman, Chairman, a Certificate should only be requested for the completion of service as Chairman."

On Wednesday, March 31st, 1993, we will be presenting Certificates of Appreciation to the following individuals:

Harold Moore	Former Chairman, Dielectric Test Subcommittee
Linden Pierce	Former Chairman - Working Group on Qualification of Transformers for Class IE, Application in Nuclear Power Stations
David Takach	Former Chairman - Working Group on Guides for Loading
Jim Templeton	Former Chairman - Working Group on Revision of Dielectric Tests
Bill Wrenn	Former Chairman - Working Group on Guides for Loading

6.2 Report from the PES Awards Committee Meeting

The Awards Committee met on February 1st, 1993 at the Winter Power Meeting in Columbus, Ohio. At this meeting, the balloting of the various technical committees of PES for Prize Paper, Prize Technical Report and Prize Standard or Guide were reviewed and winners selected. A total of 15 papers, reports and guides were reviewed and graded by various members of the Transformers Committee in December. There were no entries from the Transformers Committee.

When a standard or guide has been nominated for a prize, it has been IEEE policy that 21 copies will be supplied for distribution to reviewers at no cost. This policy has now changed and a charge will be made for the required number of copies. A questionnaire was submitted to each technical committee soliciting comments and suggestions about this new policy. The combined response questionnaire is attached. Two important points should be noted:

6.0 RECOGNITION AND AWARDS (Cont'd)

1. With respect to machine copies, IEEE policy would require reimbursement at document price less 30%.

2. IEEE Standards Office has offered to provide an 80% discount on all standards purchased by PES for review purposes.

Respectfully submitted
Robert A. Veitch
Chairman, Awards & Recognition

- QUESTIONNAIRE -
PES AWARDS COMMITTEE
PAYMENT FOR IEEE STANDARDS
USED FOR PES AWARD NOMINATIONS

This questionnaire is the result of a policy change by the IEEE Standards Office whereby Standards and Guides used for PES award nominations will no longer be provided at no charge. Technical Committees supplying the 21 copies of a nominated Standard or Guide will be billed for these copies. Your responses to the following questions will help determine how PES is impacted by this expense.

		Y	N
1.	Does your Technical Committee develop IEEE Standards and Guides?	11	1
2.	Is your Technical Committee able to cover the cost of 21 copies of a nominated Standard or Guide?		11
3.	Is your Technical Committee able to generate income to cover this expense?	1	10
4.	Do you have alternative suggestions to the IEEE policy of billing the Technical Committee? (see attached)		
5.	Additional comments (see attached)		

Please return this questionnaire on or before January 14, 1993, to:

John A. Hetrick
Ohio Edison Company
76 S. Main Street
Akron, Ohio 44308-1 890

Tele: (216)384-5623
FAX: (216)384-5791

Your Committee:

Name:

Questionnaire Comments on Alternatives to Charging Technical Committees for Cost of Standards and Guides Used in Prize Evaluation

I. Comments

A. Have IEEE contribute 21 copies without charge. (PSIM, SPDC, SWGR, PSRC)

1. Have IEEE provide one free copy and allow use of machine copies. (SPDC, SWGR, PSRC)

IEEE Response: Present policy is that each machine copy would require reimbursement of IEEE Standards Office at document price less 30% discount. Our request to machine copy at no charge is pending at IEEE.

2. PES (Awards and Recognition Department) should budget using proceeds from Winter Power Meeting and T&D Conference. (EM, TRANS, T&D, PSE)

a. If IEEE standards/guides must be purchased, PES should be charged at IEEE cost. (SPDC)

IEEE Response: IEEE Standards Office has offered to provide an 80% discount on all standards purchased by PES for this purpose. Note - IEEE members receive 30% discount on first copy only.

3. Return unmarked copies of standard to IEEE after review. (ED&PG)

4. Exempt small technical committees that are not prolific generators of standards/guides and have no source of funds. (PSC)

II. Estimated Cost to Purchase

A. 1993 actual = $51.8 average/std. x 0.2 discount x 21 copies = $218

B. Total cost:

Year	Entries	21 Copy Average	Total
1992	7	$218	$1,526
1993	6	$218	$1,308

7.0 REPORT OF TECHNICAL SUBCOMMITTEES

The following reports are those of the 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 preceding week. Any discussion from the floor presented during the Subcommittee reports precedes the formal report.

Secretary's Note: Subcommittee reports have been edited to match the format of the remainder of the minutes. No changes have been made to the content of these reports except dropping the list of members' and guests' names in attendance where provided by the subcommittee. A summary of attendance is included.

Following each subcommittee report is a listing of the current status of each of the subcommittee's assigned standards, as described in G. H. Vaillancourt's report to the Administrative Subcommittee.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.1 AUDIBLE SOUND AND VIBRATION SUBCOMMITTEE - A. M. Teplitzky

AUDIBLE SOUND SUB-COMMITTEE
MARCH 30, 1993 MEETING MINUTES

The Audible Sound Sub-Committee met on March 30, 1993 at 2 p.m. and reviewed the progress of its various projects. Fifteen guests and eleven members were present. The Sub-Committee unanimously approved the minutes of its last meeting.

After the introductions of the attendees, the Sub-Committee Chairman Allan Teplitzky announced that Len Swenson had retired from BPA, and that the Sub-Committee Secretary was vacant. The Chairman expressed his appreciation for Len's many years of service to the Sub-Committee, and the members wished him the very best of luck and a very happy and healthy retirement. Len's participation will be sorely missed.

Jeewan Puri was appointed the new Sub-Committee Secretary.
Tim Bode (Puget Power), Subhash Tuli (Magnetic Electric), and Joe Foldi (ABB) were welcomed as new members of this Sub- Committee.

Teplitzky announced that draft 13 of the audible sound emission measurement standard has been approved for inclusion in IEEE Test Code C57.12.90 for liquid immersed power transformers.

After some discussions, the sub-committee agreed to continue preparing a "Transformer siting Guide" that would be primarily based on the research studies sponsored by the Empire State Electric Energy Research Corporation. Jack McGill accepted the position of Chairman of the Working Group responsible for drafting the guide. Seven other participants also agreed to help Jack in this Working Group. The Working Group's first job is to submit a new PAR for the project.

The issue of reviewing the "standard sound levels" for oil immersed transformers published in NEMA Pub. No. TR1, Table 0-1, was discussed. Jeewan Puri reported that Nema Pub No. TR1 is currently being revised. However, it appears that there is no new data available for changing the noise levels listed in the NEMA document. It was agreed that Jeewam will write to NEMA and obtain their permission to revise Table 0-1 (NEMA-TR1). He will also obtain NEMA's authorization for updating this table if it is found to be necessary on the basis of sound level data of commercial transformers.

A task force was established to draft a standard for measuring the transformer sound intensity. The procedure will be included in C57.12.90 when this standard becomes due for revision in about 1996. Subhash Tuli agreed to chair this task force. He will compile background information, including the CIGRE work, on this subject, and he will propose an outline for a draft standard by the next Sub-Committee meeting.

There being no other new business, this meeting of the Audible Sound Sub-Committee was adjourned at 3:15 p.m.
Allan Teplitsky

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.2 BUSHINGS SUBCOMMITTEE - L. B. Wagenaar

MINUTES OF MEETING BUSHING SUB-COMMITTEE
Portland, Oregon
March 30, 1993

After the meeting Florian Costa and Keith Ellis requested membership of the bushing sub-committee.

1. Chairman L. B. Wagenaar open the meeting at 2 pm by welcoming the members and the guests present. The members and the guests introduced themselves. Pritpal Singh had to leave early so Devki Sharma volunteered to be secretary for the meeting.

2. Chairman's Remarks

   Mr. Wagenaar made the following remarks:

   a) The next Transformer Committee Meeting will be held in St. Petersburg, Florida, on October 31 to November 3 at the Tradewinds Hotel.
   b) The next IEEE T&D Expo will be held in Chicago during April 1994. Members were solicited to offer their suggestions of topics for tutorials, panel discussion, etc.

3. The minutes of the last meeting held in Cleveland were approved as written.

4. Working Group Reports

   a) Revision of C57.19.01 - Pritpal Singh, Chairman

      The WG on revising C57.19.01 (Performance Characteristics and Dimensions) met on March 29, 1993, at 9:35 am with five members and seven guests. Three guests requested membership to the Working Group.

      After the introduction of members and the guests, the minutes of the October 20, 1993, meeting held in Cleveland were approved as written. The WG then discussed the following:

      Discussion on Russ Nordman's Proposal

      Russ has proposed to standardize on five voltage classes up to 196 kV voltage class. Each voltage class has three current ratings. It has also been proposed that the bushings be good for all service conditions (eg. high altitude, low temperature). The lower voltage bushings are to be good for horizontal/vertical application.

There was considerable discussion on the proposal but it was agreed that we need more input to decide a course of action.

Some of the questions are:

- Should we maintain all voltage classes
- Should we maintain two groups of bushings - one for usual conditions and another for unusual conditions.

Harold Moore agreed to check with EEI and try to get a copy of their survey on standardization of ratings.

Stan Osborn agreed to ask for inputs from Doble's Bushing committee. This information will be made available to the WG members before the next meeting so that it can be discussed in the meeting.

RATINGS, TESTS AND CAPACITANCE & POWER FACTOR LIMITS

Tables 1, 2 and 10

These tables were approved as per earlier revisions.

Table 9 - PD Limits

It was agreed to add a note as follows:
"This table does not imply that the ratio of picocoulobs to microvolts is equal to one"

Table 8 - Cantilever Test Requirements

As agreed at the last WG meeting, a worksheet was attached to explain the test values included in this table. Members and guests were requested to bring their comments to the next WG meeting.

The meeting was adjourned at 10:50 am.
It is requested that the WG be given two meeting slots at the next Transformer Committee Meeting.

b) Bushings for DC Application, C57.19.03 - Olof Heyman, Chairman

The following was reported by Devki Sharma on behalf of Olof Heyman who had to leave early:

The working group on Bushings for DC Application met on March 29, 1993, with eight members and nine guests in attendance.

After introductions, the result of the first WG ballot and the comments received with the ballot were discussed.

It was reported that the ballot results were as follows:

Ballots sent out	12
Ballots returned	7
Approved	2
Not Approved	5

All negative comments - up to section 7.2.4.2 (Dry Switching Impulse Tests) of the draft - were discussed and successfully resolved. Due to lack of time, the remaining comments could not be discussed.

Dr. H. Schneider gave a short but very informative presentation on the behavior of DC bushings during pollution and rain tests. This presentation was based on the tests carried out by EPRI. The test results offer conclusions which are at variance with previous European (Swedish) studies.

As a result of this presentation, the W.G. decided to modify sections 7.4.2 and 7.4.3 (Even and Uneven Rain Tests) of the draft.

Some of the other recommendations were as follows:

1) Rain water conductivity should be 49 - 66 μs/cm
2) Length of dry zone (for uneven rain test) should be given as a percentage of the bushing length.
3) Test voltage of 1.25 x DC voltage is too high.
4) Uneven rain test can be destructive and not recommended.

c) Bushing Application Guide, C57.19.100 - Fred Elliott, Chairman

The Working Group met on Monday, March 29. Seven members and 14 guests participated in the meeting.

The Cleveland, Ohio, meeting minutes were reviewed and accepted as written.

Discussion of negative ballot comments from the Bushing Subcommittee Ballot of Draft 8 of PC57.19.100 Bushing Application Guide continued from the last meeting. The WG reached agreement on a proposed resolution which will be used to develop Draft 9 for another Sub-committee ballot.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.2 BUSHINGS SUBCOMMITTEE (Cont'd)

5. Definition of CT Pocket

As a continuation of the discussion started at the last meeting, Don Lowe submitted a proposed wording for a definition for bushing current transformer pocket. It was decided that this definition would be placed in the next revision of C57.19.00 and that something is also required in the Bushing Application Guide, C57.19.100. Don Lowe will propose a wording and look for the appropriate location in the Bushing Application Guide.

6. Report of Technical Advisor to IEC/SC 36A - No report.

7. New Business

Under new business, Loren Wagenaar introduced a question of loading capability of draw-lead conductors. It was pointed out that guides and standards give little guidance on the subject. After some discussion on the subject, Loren Wagenaar offered to write something for the next meeting to further explain the situation.

Minutes by:
Devki Sharma

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.3 DIELECTRIC TESTS - J. B. Templeton

DIELECTRIC TEST SUBCOMMITTEE
March 30, 1993 Portland, Oregon

The Subcommittee met at 9:30 A.M. on March 30, 1993 with 47 members and 41 guests present. The minutes of the October 20, 1993 meeting in Cleveland were approved as submitted.

1. Chairman's Comments

   Several items from the ADCOM meeting were reviewed. First of all, there are three kits available from IEEE for those developing standards documents. The kits are; IEEE Standard Starter Kit, Post Project Approval Kit, and the Standard Board Approval Kit. Second, the next Standards Board meeting is scheduled for June 17, 1993 and the submittal deadline is May 7, 1993. Lastly, the Subcommittee was solicited for input for a potential panel discussion or tutorial to be given at the IEEE T&D Meeting to be held in Chicago in April, 1994. Any suggestions are to be submitted to the Chairman.

2. Working Group Reports

   1. Working Group on Revision of Dielectric Tests - J. B. Templeton, Chairman

      Mr. Bertrand Poulin has agreed to be chairman of this Working Group commencing with the next meeting.

      The Working Group met on March 29, 1993 at 4:15 P.M. with 28 members and 22 guests present.

      The minutes of the October 19, 1992 meeting in Cleveland were approved as submitted.

      The Task Force reports were as follows:

      a. Task Force on Revision of Impulse Test Guide - R. E. Minkwitz, Sr., Chairman

         The Task Force met on March 29, 1993 at 9:30 A.M. with 25 members and 24 guests present. The minutes of the October 19, 1992 meeting in Cleveland were approved as submitted.

         The first order of business was to discuss the ballots for Draft 1 of revisions to C57.12.00 and C57.12.90. The two ballots dealt with impulse testing of neutral terminals and terminals brought out from buried windings.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.3 DIELECTRIC TESTS SUBCOMMITTEE - (Cont'd)

Ballot A was for C57.12.00 and the summary of the ballot follows:

Approved	87
Approved with comments	23
Negative	4
Abstain	6
EM ballots not returned	7
Ballots mailed	161
Total returned	120

The ballot was successful with 77.9%.

Ballot B was for C57.12.90 and is summarized as follows:

Approved	85
Approved with comments	21
Negative	7
Abstain	7
EM ballots not returned	7
Ballots mailed	161
Total returned	120

The ballot was successful with 77.9%.

The negative ballots were due to wording, duplication between C57.12.00 and C57.12.90, and that there were items in C57.12.00 not addressing requirements and items in C57.12.90 not addressing procedures. Consensus was reached to resolve the negative ballots and the modifications will be made in order to ballot the main committee.

The February 1993, Draft 1 ballot of C57.98 revision was then discussed. The ballot summary is as follows:

Approved	99
Approved with comments	10
Negative	1
Abstain	9
EM ballots not returned	10
Ballots mailed	161
Total returned	119

The ballot was successful with 78.8%. The one negative vote was resolved, and editorial changes will be made such that the document can next be sent to the Standards Board for approval.
The meeting adjourned at 11:33 A.M.

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

The Task Force met at 10:55 A.M. on March 29, 1993. The minutes of the October 19, 1992 meeting in Cleveland were approved as submitted.

Bob Degeneff presented preliminary calculations dealing with the voltages and energy available when a full wave impulse is clipped by arrester action. With the various scenarios presented it is possible for voltages impinging on the transformer windings to be greater than the design level of the transformer. However, these were preliminary calculations and more will be done between now and the next meeting. Bob will obtain information from AEP so that he can have calculations performed for a 765 KV autotransformer and a set of parallel calculations will be made by Elin.

Bob asked for information that anyone may have dealing with the history of the development of the existing volt-time curve for transformers. He is attempting to develop a bibliography for reference.

The meeting adjourned at 12:10 P.M.

c. Task Force on Revision of the Induced Test - M. Perkins

This was the first meeting of this newly formed Task Force. The meeting convened at 8:00 A.M. on March 29, 1993.

Mark Perkins led the discussion with a proposed scope for the Task Force. The scope was determined to consist of the following:

- Investigate applicable IEC Standards and actual practices in Europe.
- Target revision of C57.12.00 and C57.12.90.
- Replace RIV with apparent charge measurements and define acceptance criteria.

- Define the various aspects of the one hour induced test. -Enhancement time. -Define base readings. -Determine method for taking apparent charge measurements. -Define increasing trend. -Define how often to take readings. -Determine the terminals to be monitored.

Information will be distributed before the next meeting on IEC standards as well as actual practices being followed.

The meeting adjourned at 9:15 A.M.

There were two items of new business brought before the Working Group. First, Loren Wagenaar presented information from a paper that he co-authored and which was presented at the Winter Power Meeting on "EHV Transformer Dielectric Specification Improvements." Loren's discussion focused on two areas; expanding transformer standards to incorporate special requirements for EHV transformers and make improvements in testing requirements of all transformers. The paper covered several details, therefore, it will be distributed as an attachment to the Working Group minutes and will be discussed at the next meeting.

Tom Traub then addressed the Working Group for assistance to coordinate with the Working Group on LTC Performance Requirements. The document being revised in his Working Group contains dielectric testing requirements. Therefore, it is proposed that the Working Group on Revision of Dielectric Tests be balloted on the dielectric testing portion of the LTC document for the necessary coordination.

The meeting adjourned at 5:30 P.M.

3. Working Group on Revision of Dielectric Tests for Distribution Transformers - J. R. Rossetti, Chairman

The meeting was held on March 29, 1993 with 9 guests and 8 members present. After introduction and approval of the minutes from the Cleveland meeting, Don Ballard reported on the work in the Task Force meeting held earlier. The minutes of the Task Force on Writing a Guide for Routine Impulse Testing of Distribution Transformers is as follows:

The Task Force was convened at 8:00 A.M. with 8 members and 6 guests in attendance. Members and guests introduced themselves and the minutes of the Cleveland meeting were approved as written.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.3 DIELECTRIC TESTS SUBCOMMITTEE - (Cont'd)

Steve Smith presented a draft of the Scope, Purpose and Reference sections of the Guide. He assumed that the Guide would be separate from C57.98. There was some discussion on the purpose section. The focus of one sentence was changed to refer to the sensitivity of the fault detector rather than need for operator attendance. A couple of sentences will be deleted as not being part of the purpose. It was also decided to add the C57.12.20 series of standards and the IEEE-4 standard to the references.

Larry Hilsenbeck presented a report of a fault detection method which utilizes a current transformer with a voltage output. The reduced and full filter current waves are integrated and a criteria of 30% difference is used to detect faults. His report will be expanded to include a resistive current shunt and added to the Guide.

Jerry Corkran presented a paper which analyzed the impulse characteristics of a distribution transformer and the effect of different faults on these characteristics. Parts of the analysis will be included in a section on fault detection using an R C shunt.

Glen Millen presented a report on detecting a single turn fault in a step voltage regulator. His data correlated with similar tests on distribution transformers. He pointed out that the current stepped voltage regulator test procedure includes shorting the series winding which makes the detection of a single turn fault nearly impossible. He also brought up the subject of a 10 bit verses 8 bit digital oscilloscope. We discussed taking exception to a 10 bit scope requirement for routine impulse testing.

We plan to have a draft ready for the Task Force to review at the fall meeting.

Don indicated that the Working Group may be able to review the Guide at our Spring 1994 meeting. The Task Force hopes to be able to ballot the first draft in the fall of 1994. Chuck McMillen suggested that the document might be written as a Trial Use Guide.

Georges Vaillancourt will give a report on the submittal of C57.12.90 to the Standards Board at the Subcommittee and Main Transformers Committee Meeting. C57.12.90 c (Routine Impulse Test for Distribution Transformers) was consolidated into C57.12.90 to form a single revised standard from the separate projects C57.12.90 b, c, and e.

Georges Vaillancourt has submitted a PAR for the Working Group project covering a "Guide for Protection of Distribution Transformers" with emphasis on secondary (low-voltage) side surges. George discussed with John Posey, standard, coordinator of the SPD Committee, as to whether this project is within the scope of the Transformer Committee or to that

of the SPD Committee. It was decided that to start, the Transformers Committee will sponsor the new document. However, depending on the way the work will progress later on, we may decide to transfer it to SPD or to make it a joint document.

There being no further discussion or new business, the Working Group adjourned at 1:55 P.M.

4. Working Group on Partial Discharge Measurement for Transformers
E. Howells, Chairman

The Working Group met at 8:00 A.M. on Tuesday March 30th. There were 66 people in attendance; 13 members and 53 guests. Following the customary introductions, the minutes of the Cleveland meeting were approved as written.

The first order of business was the report from the task force on "Acoustic Emission Location of Partial Discharge Sources in Oil Filled Transformers and Rectifiers."

The Task Force, chaired by Ed Howells, met at 9:30 A.M. on Monday March 29, 1993. There were 16 attendees made up of 6 members and 10 guests.

The Guide addresses 3 types of locating systems.

a) An all acoustic - portable system.
b) An all acoustic - permanently installed system.
c) A combined acoustic/electrical system.

These had been developed as separate issues and were now being incorporated into one cohesive document. As might be expected, some editorial conflicts were found and much discussion revolved around the best way to resolve these. As a consequence, time ran out before the process had been completed: arrangements were then made for those present to send any other comments/ suggestions to the chairman for incorporation before the next meeting.

It was requested that 2 sessions be made available at the next meeting to enable the task force to essentially finish work on the Guide in readiness for the Working Group Appraisal. As previously stated, time ran short and the meeting closed at 10:45 A.M.

The main thrust of the Working Group was expansion of its charter to include the "In-service" measurement of partial discharges in transformers. Relative to acoustic techniques, Jack Harley reported that

he knew of more than 20 permanently installed monitoring systems and these were currently generating data. Ed Howells stated that a significant number (over 100) single channel units were in use and much of that data could be obtained.

The Working Group then felt that there was enough information available to develop a worthwhile data base relative to acoustic PD measurement technology. There was less confidence in the availability of electrical in-service PD measurement data.

Don Ballard, associated with the Revision of Dielectric Tests on Distribution Transformer Working Group, reported that some information on this approach has been presented at the recent Doble Conference. He also believed that there were a few CIGRE Reports on the topic. In general, he felt that much of this was based on techniques originally developed for rotating machinery.

Much discussion ensued and the consensus was that the technology was in its early stages and commercially available equipment had only become available in the last 6 months or so. Consequently, there had been limited experience and the available data could be quite sparse.

It was then decided to develop a 2 part PAR as follows:

a) Develop a data base and produce a Trial Use Guide for the application of acoustic PD measurement techniques to in-service monitoring of transformers.
b) Form a data base of current electrical techniques for in- service transformer monitoring and if sufficiently comprehensive, develop a Trial Use Guide for its application.

A question was raised as to whether dry-type transformers should be included in this work. It was decided that the Dry Type Sub- committee was the correct forum for that effort, especially as it was known that they were currently working on a Partial Discharge Test Document.

This provoked considerable discussion on the apparent fragmentation of efforts relative to partial discharge test documents associated with the Transformers Committee. It was known that efforts were underway or had already been completed in the Instrument Transformers Subcommittee, Dry-Type Transformer Subcommittee and Bushing

Subcommittee with little or no liaison being evident. [Relative to our own Subcommittee's Task Forces, Ed Howells has joined the Revision of Dielectric Tests Task Force and Don Ballard will attend our Working Group Meeting.]

It was felt that this was an inefficient use of available talent as well as being a system which invited confusion.

The Working Group therefore decided to request the Subcommittee to give this topic some attention with a view to asking the Main Committee to provide liaison and oversee all efforts associated with the development of partial discharge tests/measurement documents.

This completed the work for this session. There being no other business, the meeting closed at 9:10 A.M.

The Subcommittee addressed the issue raised by the Working Group concerning the various groups within the Transformer Committee working on partial discharge tests. It was decided to arrange liaison between the various groups (Instrument Transformers, Dry- Type, Bushings, and Dielectric Test S.C.) rather than organize all efforts into a single group.

3. Liaison Activities

During the Winter Power Meeting John Crouse attended the first meeting of the Working Group on Insulation Coordination. The objective of the new working group is the revision of ANSI C92.1- 1982, Standard for Power Systems Insulation Coordination. This group will meet three times per year.

4. New Business

Mr. H. Fischer asked the Subcommittee as to which group in Transformer Committee should address direct measurement techniques of hot spot temperatures. It was suggested to have the Thermal Evaluation Working Group address the issue.

Mr. B. Patel then asked a question as to which document contains external clearance standards. George Vaillancourt indicated that external clearances were contained in the recently approved revision of C57.12.00.

The meeting adjourned at 10:00 A.M.

Respectfully Submitted,
J. B. Templeton Subcommittee Chairman

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.4 DISTRIBUTION TRANSFORMERS - J. C. Thompson

TRANSFORMER COMMITTEE
DISTRIBUTION TRANSFORMER SUBCOMMITTEE WG C57.12.2
MEETING MINUTES
Red Lion Lloyd Center, Portland, Oregon
March 30, 1993

The meeting started at 2:00p.m. with the introduction of attendees. The roster was circulated and updated.

The Minutes from the Fall '92 Cleveland Meeting were reviewed and approved. RESULTS FROM THE MARCH 29, 1993 ADCOM MEETING: There were 240 in attendance at this meeting. The next meeting will be in St. Petersburg, Florida, on October 31st. Rooms will cost $105.00 per night. Numerous activities are being planned for the spouses.

1. Status of Standards

   C57.12.26 is in the process of being balloted by the IEEE Main Committee.

   C57.12.23 is ready to be balloted but has not gone out yet.

   John Gauthier, NEMA Secretary, presented the specification approval/publishing process. The process has been modified to expedite the approval process. Most (95%) of the standards should get published within a 4-month period. Working Group Chairmen stated that the balloting process generates numerous comments from the EL&P delegates, however, few are received from the manufacturers. When no comments are received from NEMA delegates, NEMA normally does not respond. IEEE, EEI and NEMA have different approval processes; however, 75% affirmative IEEE ballots will approve a standard. John Gauthier will get Jerry Thompson a simplified flow chart describing the approval process. A deadline for ballot return should be indicated on the ballots.

2. Working Group Chairmen Reports

   a. C57.12.20 - To be published in 1993 and has successfully been balloted through the Working Group. Will now be forwarded to NEMA, IEEE Main and EEI for balloting.

   b. C57.12.21-1980. Draft 12 has been approved by the Working Group. It has been forwarded to NEMA, EEI and IEEE Main for balloting.

   c. C57.12.22-1988. Document has passed subcommittee and EEI ballots; still waiting for NEMA ballot.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.4 DISTRIBUTION TRANSFORMERS SUBCOMMITTEE - (Cont'd)

d. C57.12.25-1990. In the process of assembling Draft 1, numerous cabinet dimensional issues were discussed. In order to fully understand the issues, a user survey will be compiled and received by the Working Group. The survey will then be distributed by EEI. Survey results will be discussed at the St. Petersburg Meeting.

Concern was voiced about combining C57.12.25 and C57.12.21 prior to the scheduled 1995 C57.12.25 revision date.

e. C57.12.26-1987. Hope to publish in 1993 but waiting on the IEEE Main Committee ballot. Live and Dead Front Standards are in the process of being combined.

f. C57.12.28 - Scheduled to be revised in 1993 but probably will not be ready. Expect to ask for an extension.

g. C57.12.29 - Was published in 1992.

h. C57.12.30 - The group expects to ballot its standard after the Fall '93 Meeting. A definition for carbon steel the correct temperature for performing the gravelametric test must be determined.

i. C57.12.31 - After safety issues were documented, the Working Group has progressed to Draft 3. Draft 3 will be discussed at the fall meeting.

j. Bar Code Standard - Draft 3 was presented and discussed to a large group of attendees. A list of transformer manufacturer codes and management of the list were discussed. The group also discussed how to evaluate the performance of permanent bar codes. Performance criteria exist for temporary but not for permanent bar codes.

k. Electronic Transfer of Transformer Test Data - Dave Lyon chaired the first meeting of this Working Group. After discussing the purpose and scope of the PAR, the group generated a list of 56 items that would be nice to have on a test report. The list will be prioritized and narrowed down at the next meeting. There was good user and manufacturer participation.

l. Enclosure Integrity Working Group - This Working Group is responsible for the padmounted (C57.12.28), severe environment (C57.12.29), submersible (C57.12.30) and overhead (C57.12.31) coating standards. Due to increased cooperation, NEMA will remain secretariat to this group.

The integrity group meets 2 times per year; once concurrently with the IEEE Transformer Committee and the other at a sponsoring utility. Since this group depends on technical support from coating suppliers, their meeting requires more time for them to be meaningful. Meetings have ranged in length from 1-1/2 to 3 days. The subcommittee asked for as much advance meeting notice as possible.

The Chairman urged all attendees to participate in the development of the integrity specification.

The attendees did not object to a permanent color change of an overhead transformer coating due to an oil leak.

Discussion revealed that C57.12.00 does not fall under the responsibility of any subcommittee. Revisions are processed via the Transformer Committee Standards Coordinator.

The following schedule for future meetings has been established:

October 31-November 3, 1993	St. Petersburg, FL
March 20-23, 1994	Dallas, TX
September 24-28, 1994	Milwaukee, WI
Spring 1995	Kansas City, MO
Fall 1995	Boston, MA
Spring 1996	San Francisco, CA

3. New Business

A proposal was made to have all Working Groups chaired by a user and manufacturer co-chairman. This would aid with the workload, provide a backup chairman and develop committee leadership. Since most standards are in the process of being combined, this would be an ideal time for implementing the concept.

A motion was carried to implement the co-chair concept. Each Working Group will select a co-chairman at the Fall 193 Meeting.

These Minutes were prepared from notes taken by John P. Lazar, Northern States Power.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.5 DRY-TYPE TRANSFORMERS - W. Patterson

DRY TYPE TRANSFORMER SUBCOMMITTEE
MEETING MINUTES
PORTLAND, OREGON - MARCH 30, 1993

1. Chairman Remarks and Announcements

The Dry Type Transformer Subcommittee met at 2:00 p.m. with 23 members and 16 guests present. The first order of business was the approval of the minutes of the 10/19/93 meeting in Ohio. The minutes were approved as written.

a. The next order of business was the presentation of the reports of the various working groups. See the following sections for the individual reports:

Sec.2	Dry Type Reactors - HVDC Smoothing	R. Dudley
Sec.3	Dry Type Reactors - Current Limiting	R. Dudley
Sec.4	Specialty Transformers	R. Simpson
Sec.5	Test Code Revision	D. Barnard
Sec.6	Cast Coil Loading Guide	L. Pierce
Sec.7	Thermal Evaluation & Flammability	R. Provost

b. Following Mr. Barnard's presentation, a discussion on how to deal with the hot spot issue ensued. A motion was made and unanimously approved to have Messrs. Mutschler and Pierce formulate verbiage to be included in the Forward to C57.12.91 D6 and then to have D6 balloted by the Dry Type Subcommittee and Transformers Committee simultaneously.

c. Following Mr. Provost's presentation, a discussion ensued on the validity of C57.12.60 - a trial use standard being accepted by ANSI as an American National standard. No actions were taken on this issue.

d. Mr. Jonnatti discussed his investigation into how to proceed with dealing with the upcoming reaffirmation of C57.12.01. A motion was made and approved to formulate a WG to review and or revise C57.12.01 before the reaffirmation vote.

Mr. Jonnatti agreed to chair the WG. Sixteen Subcommittee members agreed to participate on the WG.

e. Mr. Sullivan reported on his investigation into where sound level performance criteria might be included in the standards. There was mixed response from within his task force on whether it belonged in the product standards (C57.12.5 series) or the general standard (C57.12.01).

Following discussion within the Subcommittee a motion was made by Mr. Sullivan that a Task Force within the above mentioned WG on C57.12.01 be created to decide if the sound level criteria be included in C57.12.01 and if so, to establish the sound criteria. This motion was unanimously approved. Mr. Barnard recommended that the Task Force review that latest issue of NEMA ST20.

f. Mr. G. Pregent presented a summary of the activities within CSA regarding the establishment of efficiency standards within the dry-type industry in Canada. Maximum loss values for no load and load losses per KVA are being developed. Mr. Pregent explained some of the rational being used to establish the loss values, notably 3CDN/watt of no load and 1CDN/watt of load loss. It was also noted that the US Energy Department is also investigating this issue and that CENELEC has already established loss criteria for Europe.

g. Mr. Pierce gratuitously gave a full presentation of his presentation at the Winter PES meeting on hot spot temperatures in dry type transformers. He is to be congratulated on his work in this area and his willingness to present his results to this Subcommittee.

Following Mr. Pierce's presentation a very lively discussion took place on how to proceed given his research results. Finally a motion was made and approved that a working group should be created to address the hot spot issue. Ms. Paulette Payne agreed to chair the WG. Ten of the Subcommittee members agreed to participate in the WG.

h. There being no further business, the meeting was adjourned at 5:00 p.m.

i. Attendance Summary

	Present	Absent
Members:	23	10
Guests :	16	

2. Working Group on Dry Type Reactors - Chairman: Mr. Richard Dudley
Ref: Dry Type HVDC Smoothing Reactors

This working group is currently undertaking revision of C57.16 which will include only dry type reactors as approved by the Main Transformers Committee. The original document included both oil and dry.

A Task Force of the Dry Type Reactor WG has been created to provide input to the Subcommittee on HVDC Converter Transformers and Smoothing Reactors for a future standard on Smoothing Reactors including both liquid and dry. The following are minutes for this Task Force.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.5 DRY-TYPE TRANSFORMERS SUBCOMMITTEE - (Cont'd)

The Dry-Type Air Core HVDC Smoothing Reactor Task Force met on 03/29/93 at 8:00 a.m. in the Portland room of the Red Lion Hotel (LLoyd Center) in Portland, Oregon. There were 8 members and 4 guests present. The 4 guests requested membership. The following are the highlights of the meeting.

a. The attendance list was circulated.

b. A draft of a table covering temperature rise limits was discussed at length. Key points are as follows:

1) The average temperature rise and hot spot temperature rise are upper limits and neither are to be exceeded.

2) The difference between the heat spot rise and the average rise is not intended to be an indication of hot spot allowance. Hot spot allowance is very much design related and no simple rule can account for it; especially with the wide variety of custom engineered designs available today.

3) Since hot spot determines service life, the measurement of hot spot during the "heat run" type test is important. Guidelines on how to measure hot spot will be included in Section 11.4.4.

4) Temperature rise limits for oil-paper systems were discussed as an example of how experience plays a role in establishing limits. An oil-paper system is basically a 105°C Temperature Class (Class A) and the allowed average rise is 65°C with a corresponding hot spot rise of 80°C, whereas for dry-type reactors, the corresponding limits are 55°C and 65°C.

5) The current draft of the table "Limits of Temperature Rise for HVDC Smoothing Reactors" appears to be in line with the corresponding IEC document. This will be checked.

The current draft of the table was basically accepted provided notes are added to reflect the above discussions.

c. Bill Kennedy tabled a first draft of the complete document "General Requirements And Test Code For Dry-Type And Oil-immersed Smoothing Reactors for D. C. Power Transmission." In it he included new ideas plus the current inputs from the Dry-Type Air Core Smoothing Reactor Task Force. The following was discussed:

1) Table 5 covering temperature rise limits was based on a previous version and not the one under current discussion. It will be modified at the next meeting.

2) Note (3) of Table 5 should be clarified and expanded to better define "excessive temperature" of auxiliary parts. For example, materials and components such as insulator caps will be addressed.

3) Table 4b covering tests was discussed and the following noted:

Seismic should be classified as OTHER and a note should be added to briefly describe how the verification should be done.

When OTHER tests are required by the "end user," they should be specified as "design" or "routine."

Should the "Current Surge Test" be classified as OTHER since it is very expensive? It was also deemed more appropriate that it be renamed as "Short Circuit Withstand."

OTHER tests should be renamed OPTIONAL.

The "Chopped Wave Impulse" and "Switching Impulse" tests are OTHER tests.

If OTHER tests are performed, what should the overall test sequence be?

When the test code is drafted for the "Short Circuit Withstand," the test background should be supplied for the type of in service faults that can occur; for example, regular line side faults or converter side faults.

The general test sequence defined in NOTE (1) of Table 5 was accepted. Test sequence is as important as the individual tests.

Reference the "Short Circuit Withstand" test, dielectric tests should be performed after this test to confirm no damage occurred as a result of the test. In fact, a full range of routine tests should be carried out including inductance and loss measurement.

d. The dielectric test sequence presented by the Chairman was discussed and was accepted.

e. The Chairman agreed to make all changes related to the discussions outlined above and to produce a draft for uncompleted actions of Test Code for the next meeting in St. Petersburg.

f. The meeting was adjourned at 9:15 AM.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.5 DRY-TYPE TRANSFORMERS SUBCOMMITTEE - (Cont'd)

g. Attendance Summary

	Present	Absent
Members:	8	12
Guests :	4	

3. Working Group on Dry Type Reactors

Chairman: Mr. Richard Dudley
Ref: C57.16 - "Requirements for Current Limiting Reactors"

This working group is currently undertaking revision of C57.16 which will include only dry type reactors, as approved by the Main Transformers Committee. The original document included both oil and dry.

A Task Force of the Dry Type Reactor WG has been created to provide input to the Subcommittee on HVDC Converter Transformers and Smoothing Reactors for a future standard on Smoothing Reactors including both liquid and dry. See Sec.2 for the minutes of this Task Force.

The Dry Type Reactor WG met on March 29, 1993 at 2:50 PM in the Wudler Room of the Red Lion Hotel (Lloyd Center) in Portland, Oregon. There were 7 members and 6 guests present. Two of the guests requested membership. The following are the highlights of the meeting:

a. The attendance list was circulated.

b. The minutes of the Cleveland meeting were approved.

c. The meeting of the Dry-Type HVDC Smoothing Reactor TF was reviewed.

d. The most recent draft of Table 4 for the revision of C57.16 was discussed. This Table sets out temperature rise limits. The following are the key points.

1) In order to provide consistency of philosophy, the hot spot temperature rise limits should be based on a 20°C ambient temperature to reflect the fact that series reactors are load cycled. This important operating fact strongly impacts the life of the insulation system. A note will be added to Table 4 to refer to Appendix A for more information. A section will be added entitled "Thermal Considerations." Included in this will be:

Temperature rise limits and aging will be discussed in the context of ambient temperature and load cycling. Guidance on the specifications of series reactors will be provided from a realistic temperature rise point of view. Overloading requirements will be outlined as to how they should be presented; for example, examples of overloading profiles. The effect of overloads on auxiliary compartments will also be reviewed.

The hot spot temperature rise limit based on a 20°C ambient will be reviewed in terms of insulation life.

2) It was pointed out that operating an insulation material at temperatures beyond the Temperature Index does not imply that immediate failure will occur and that it is quite acceptable to do this. It is the overall temperature-time characteristic over a long period of time that determines total service life.

3) The difference between hot spot rise and average rise in Table 4 is not meant to imply a hot spot allowance.

e. Section 11.5 (Temperature Rise Tests) in Draft #5 of the revision of C57.16 will be expanded to include details of how to measure "hot spot" temperature. Equipment, method and location will be discussed.

1) Guidelines on how to measure DC resistance as part of the temperature rise test will be provided. Key will be avoidance of thermocouple effects. Copper bridge leads should not be used to measure the DC resistance of reactors employing aluminum windings and vice verse.

f. Written comments provided by P. Riffon were discussed. Key points covered were:

1) When "heat rises" are performed at reduced current, an exponent of "2" should be used in the temperature rise correction unless the use of a lower value can be proven; for example, by using the actual cooling curve obtained by the "heat run."

2) The end of the "heat run" should have two criteria. Thermometer readings should be stable to within 1°C for a one hour period and the duration of the heat run should be at least 5 thermal times constants.

3) When the optional chopped wave impulse test is performed, it should consist of 1 reduced full wave, 1 full wave, 1 reduced chopped wave, 2 full chopped waves and 2 full waves.

4) The issue of terminal temperature rise was discussed. Should terminal temperature rise be based on the type of contact surface? Should reference be made to IEC 343? Should the existing 60°C rise guideline be maintained and examples of other considerations be provided?

The ANSI-IEEE Switchgear Standard C37.41 will be consulted for guidance.

g. The Chairman agreed to produce Draft #6 of the revision of C57.16 for the St. Petersburg meeting. The above information and inputs outstanding from the Cleveland meeting will be included in it. Draft inputs for the remaining uncompleted sections will also be produced. The Chairman thanked everyone who had made contributions.

It was also mentioned by the Chairman that balloting could take place on a Draft #7 of the revision C57.16 by the Dry Type Subcommittee and the Performance Characteristics Subcommittee following the St. Petersburg meeting.

h. The meeting adjourned at 5:20 p.m.

i. Attendance Summary

	Present	Absent
Members:	7	12
Guests :	6	

4. Working Group on Specialty Transformers - P259
Chairman: 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.

a) The working group met on 03/30/93 at 11:30 a.m. with 4 members and 2 guests present. Following introductions, the minutes of the 10/19/92 meeting in Cleveland, Ohio were approved as written.

b) The status of IEEE Std. 259 was reviewed.

1) All four negative ballots from SCC#4 have been resolved.

2) IEEE Std. 259, Draft 8 has been submitted to RevCom, and barring unforeseen problems should be renewed in 1993.

c) The next order of business was to review the need to continue WG 259. The members agreed to continue working on revisions and updating IEEE Std 259 as follows:

1) Review all "Shall/Should" statements for correctness as was to have been done on Draft 9 but was not due to extenuating circumstances.

2) Review IEEE Std. 259 as it relates to IEEE Stds 117 and 266, if possible, to applicable IEC Standards.

3) Review comments received on four negative ballots from SCC#4.

d) The Chairman requested participation from more manufacturers and users as there are presently only 6 active members of this WG.

e) The meeting was adjourned at 11:50 a.m.

f) Attendance Summary

	Present	Absent
Members:	4	3
Guests :	2	

5. Working Group on Test Code PC57.12.91
Chairman: Mr. David Barnard
Secretary: Mr. Henry Windisch
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.

a. The working group met for two sessions. The first session was called to order by Chairman David Barnard at 10:55 a.m. on 03/29/93. This session was attended by 20 members and 3 guests.

b. Introductions were made and the Minutes of the Cleveland Meeting were read by Secretary Henry Windisch and approved as read.

c. Chairman David Barnard announced that on Draft 5, only 22 ballots were returned out of the 39 ballots mailed. Chairman Barnard expressed disappointment in the response to this ballot and emphasized again the importance of returning the ballots.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.5 DRY-TYPE TRANSFORMERS SUBCOMMITTEE - (Cont'd)

d. The next item of business was review and discussion of the negative ballots received on Draft 5. Barry Ward's negative ballot discussion was postponed until the afternoon session; since Barry was not present at the morning session.

1) Linden Pierce's negative ballot was reviewed and discussed.

Paragraph 11.6 was addressed. Lin indicated that the average winding temperature rise statement needed clarification and proposed three solutions, any one of which would resolve his negative vote on this topic. After much discussion and expressions of many opinions, two votes were taken, but no consensus was reached on a statement to be used in the Standard.

2) Chairman Barnard stated that the discussion would be continued in the afternoon session.

e. The first session was adjourned at 12:15 PM.

f. The second session was called to order at 1:25 PM. This session was attended by 20 members and 7 guests.

g. Barry Ward was present so his negative ballot was discussed. Barry's suggestion that all parts of C57.12.91 be compared with C57.12.90 was discussed at length. This working group had considered this area of concern previously and found that it was too unwieldy since both Standards are in a continuous state of change. Again, it was determined that this working group would proceed without continually trying to comply with C57.12.90.

h. Barry questioned the use of the two watt meter method for measurement of losses since C57.12.90 has deleted that method.

1) The working group voted that C57.12.91 will retain the two watt meter method.

i. Barry had suggested that ratio tests described in Article 7.1.4 could be performed using single phase power. Barry presented wording for the single phase test procedure and indicated that the introductory paragraph should be revised to allow three phase or single phase testing.

1) After much discussion, it was voted to include Barry's submitted wording.

j. Article 7.3.1 regarding ratio test methods was discussed and the fourth paragraph will be modified to include the words, "of each other" at the end of the second sentence. It was voted that the remainder of Article 7.3.1 remain as written. Barry withdrew his negative vote at this point.

k. Chairman Barnard directed the meeting back to discussion of the average winding temperature rise. Again much discussion was held and reasons were propounded for and against averaging all three windings together. Finally, it was moved and second that the first sentence of Article 11.6 be revised as follows:

"The average winding temperature rise shall be determined as the average of the terminal measurements for each voltage circuit." A vote was taken and all but one voted in favor of this change.

l. Because the allotted meeting time was over, Lin Pierce's negative vote associated with hottest spot temperature rise received no discussion or action.

m. Chairman Barnard will issue Draft 6 incorporating the revisions discussed and issue it as soon as he can. He again stressed the importance of returning the ballots.

n. The meeting adjourned at 2:45 PM.

o. Attendance Summary

	Present	Absent
Members:	24	10
Guests :	7	

6. Working Group on Cast Coil Loading Guide
Chairman: 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.

a. The working group met on 03/30/93 at 9:30 AM. There were 16 members and 14 guests in attendance. Following introductions, the minutes of the 10/19/92 meeting in Cleveland, Ohio were approved as written.

b. Time constants. Equation in Draft 2.0. Will be worked on further for Draft 3.0. Informative annex with time constant data will be included. Ballot will survey whether this is practiced to approve.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.5 DRY-TYPE TRANSFORMERS SUBCOMMITTEE - (Cont'd)

c. Impact/Motor starting loading. A clause and application curve were included. The curve was derived from a published article on this subject for liquid filled transformers. This appeared to be a valid approach to the WG. This important topic probable represents the more common unusual service condition.

d. Definitions were reviewed. There were two new definitions:

Rated temperature loading. This is loading above the rated nameplate kVA but below the insulation temperature class.

Loading above rating. Limits for various insulation temperature classes were defined. The definitions were acceptable.

e. Miscellaneous comments and editorial changes for Draft 3.0 were noted

1) It is planned that Draft 3.0 will be balloted in mid-May.

f. The meeting adjourned at 10:25 AM.

g. Attendance Summary

	Present	Absent
Members:	16	11
Guests :	14	

7. Working Group on Thermal Evaluation of Dry Type Transformers
Working Group on Flammability Issues
Chairman: Mr. Richard Provost

This working group has been charged with developing C57.12.60, the therm evaluation guide for cast coil transformers. The work on this standard has bee completed and the standard was submitted to be issued for trial use. Trial u was employed due to the WG being unable to define an existing system to use a control for comparison with an insulation system under test.

Subordinate to this WG is a working group charged with monitori developments in flammability and toxicity of dry type transformers.

This working group is also monitoring the status of C57.12.56, the therm evaluation guide for conventional dry type transformers.

a. The working group met at 10:55 AM on Tuesday, 03/30/93 with members and 18 guests present. Following introductions of those prese the minutes of the 10/20/92 working group meeting in Cleveland we reviewed and approved as written.

The chairman notified the working group that ANSI/IEEE C57.12.56, "Standard Test Procedure For Thermal Evaluation of Insulation Systems For Ventilated Dry-Type Power and Distribution Transformers", was balloted for re-affirmation and was approved with 79% of votes returned and 100% affirmative. The Standard was submitted to RevCom in February and is on the agenda for the next Standards Board meeting on June 16.

The matching document on Solid Cast and Resin Encapsulated dry-type transformers, IEEE C57.12.60, was approved last September and the Edited Draft of the document is being reviewed. It is expected to be published by the end of April. We were also informed that the document is in the process of being reviewed by ANSI at this time.

A suggestion was made regarding the proper design of a model for testing under this standard. This was not included in the original document. In addition, with a two year time frame to either revise or confirm the Trial-Use Standard, the Chairman agreed to a proposal that the working group begin discussion at the next meeting regarding a test model and to begin collection of any test data that may be available based on the Standard.

b. With no other discussion regarding these documents, the Chairman opened the discussion around flammability issues. Regarding the CENELEC Document HD 464, agreement to issue copies of the document to the working group was not obtained from CENELEC, so a discussion of the document was carried out by reviewing several parts of most interest.

1) The document outlines classifications for Environmental, Climatic and Fire Behavior of dry-type transformers. It has been approved by CENELEC for use as a guide, not compulsory in most cases.

2) However, EDF (France) and ENEL (Italy) are imposing Class F1 compliance for Fire Behavior. This requires self extinction of fire within a specified time after being exposed to a fire, with minimal emission of toxic substances and smoke. The time frame is to be agreed to between purchaser and manufacturer. Also, the combustion products must be "practically halogen-free." It was noted that several European countries, including France and Germany, now require that the classifications be noted on the nameplate of the transformer.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.5 DRY-TYPE TRANSFORMERS SUBCOMMITTEE - (Cont'd)

c. CENELEC HD 538.1, outlining general requirements for Three-Phase dry-type transformers up to 2500 kVA and not exceeding 36 kV, has been modified to include the classification of transformers outlined in HD 464. However, it presently requires they meet only the lowest standards unless otherwise specified by the purchaser.

d. The CENELEC Working Group has agreed to meet in a year's time to review country differences and attempt to be more specific in terms of requirements relative to the various tests. There were no other flammability issues raised.

e. Seven guests requested membership in the working group. Since we will begin working on modifications to and evaluation of the new test procedures (C57.12.60), the Chairman welcomes them to the working group.

f. With no new business, the meeting was adjourned at 11:30 AM.

g. Attendance Summary

	Present	Absent
Members:	8	4
Guests :	18	

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.6 HVDC CONVERTER TRANSFORMERS & REACTORS - W. N. Kennedy

HVDC Converter Transformer and Smoothing Reactor
Subcommittee Meeting Minutes - Portland, OR - March 29, 1993

1. Introduction/Attendance

The meeting was called to order at 9:30 AM with a record attendance of ten members and nine guests present.

2. Review of CIGRE Working Group Activities

The first item discussed was the recent meeting of the CIGRE HVDC Working Group 12/14.10. Status of their projects is as follows:

a) Dielectric Testing Paper: This paper has been approved by both parent study committees; the paper will be published in a future issue of ELECTRA.
b) Service Performance Survey: Draft 5 was prepared by the task force and was discussed at the WG meeting; minor corrections were suggested by the working group prior to requesting parent study committee approvals.
c) Impedance Tolerance Survey: Data has been received from manufacturers and a first draft of the results was distributed at the WG meeting. Minor corrections will be made before the report is reissued.
d) Loss Measurements: Evaluation of several alternative calculation methods is continuing.
e) Acoustic Noise: A survey has been started to compare sound levels in service with those measured during factory tests.

Copies of the dielectric testing and service performance papers were distributed at out Subcommittee meeting, while copies of the earlier CIGRE JWG paper on specification content will be included with the mailing of the minutes.

3. Discussion of Ballot on Draft 6 of PC57.129

The remainder of the meeting focused on comments received from our Subcommittee ballot on draft 6 of PC57.129 "General Requirements and Test Code for Oil-Immersed Converter Transformers for DC Power Transmission." It was noted that our formula for the recommended polarity reversal test level appears to differ from that in the CIGRE report. This was discussed when we prepared our IEEE paper on HVDC dielectric test levels that was presented at the IEEE Summer Power Meeting in 1985, but we will review the material and examine the impact of the different formulae prior to our next meeting.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.6 HVDC CONVERTER TRs & REACTORS SUBCOMMITTEE (Cont'd)

There was also some discussion regarding the method that we are recommending to calculate harmonic losses. While the procedure is based on Forrest's IEEE papers, it is not in the form that most transformer engineers are accustomed to. We agreed to take another look at that section of the draft standard and rewrite it if necessary for Draft 7.

We also discussed the difference in the time period that is used to measure partial discharge activity for the dc applied test (30 minutes) and polarity reversal test (29 minutes). The polarity reversal measuring period is one minute shorter to permit the test equipment to stabilize after reversal. There was a general consensus that the first minute after reversal is the most critical period during the polarity reversal test. We recognize that the discharge activity within the transformer cannot be accurately measured during the reversal itself because of the switching of the test equipment, and will continue discussion of this subject at our next meeting.

Finally, at our meeting in Cleveland some concern was expressed regarding the partial discharge levels that were tentatively proposed for the one-hour ac applied test in Draft 5. At that time we agreed to examine the electrical stresses in the main gap of several converter transformers during the ac applied test and compare them to stresses that are achieved during the present one-hour ac induced test. Results of three converter transformers were presented at our meeting that show the applied test stresses are comparable with the induced stresses in conventional transformers, permitting us to use the same partial discharge requirements.

Respectfully submitted,
William Kennedy
Chairman, HVDC Converter Transformer and
Smoothing Reactor Subcommittee

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.7 INSTRUMENT TRANSFORMERS - J. N. Davis

INSTRUMENT TRANSFORMERS SUBCOMMITTEE
TRANSFORMERS COMMITTEE PES/IEEE
Spring Meeting, March 30, 1993 Portland, Oregon

1. Twelve members and nine guests attended this subcommittee's meeting.

2. The proposed standard, C57.13, "Standard Requirements for Instrument Transformers", will be submitted to the IEEE Standards Board in June. Two negative votes need to be resolved before the guide, C57.13.4, "Detection of Partial Discharge and the Measurement of Apparent Charge Within Instrument Transformers" is submitted to the IEEE Standards Board.

3. Under old business, the scope of this subcommittee was further discussed. The consensus was to change the scope to include capacitor coupled devices and fiber optic electronic devices. The chair will circulate a proposed scope for comments before the fall meeting.

4. New project authorization requests (PAR's) must be submitted. The subcommittee defined the need for five PAR's, three for changes and/or modifications to existing documents and two for new documents. The new documents would be (1) test requirements for EHV Instrument Transformers and (2) requirements for digital communications utilizing electronic components.

5. The working group on partial discharge met after the meeting was adjourned.

6. The meeting was adjourned at 10:00 AM.

Respectfully submitted,
John N. Davis, Chair

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.8 INSULATING FLUIDS - H. A. Pearce

IEEE
POWER ENGINEERING SOCIETY
TRANSFORMERS COMMITTEE MINUTES
INSULATING FLUIDS SUBCOMMITTEE
MARCH 29 - 30, 1993
PORTLAND, OREGON

The Insulating Fluids Subcommittee met on Monday morning, March 29, and Tuesday morning, March 30, with 23 members and 34 guests present. On Monday, the working group on PC 57-130 and the subcommittee met simultaneously.

The minutes of the meeting held in Cleveland (October 19-20, 1992) were approved as submitted.

1. Projects

   a. C57-130 Guide for Gas Analysis During Factory Test

      This session was devoted to an in-depth discussion of this guide. Host time was spent on the written portion covering Scope, Definitions, Background, and Sampling recommendations. Many changes and additions were suggested for the present draft. A new PAP was obtained. The new title will be "Guide for the Use of Dissolved Gas Analysis Luring Factory Thermal Tests row the Evaluation of Oil Immersed Transformers and Reactors." This will be a Trial Use Guide.

      The Working Group, chaired by James Kinney and assisted by Frank Heinrichs, will prepare Draft 6 for circulation to the entire subcommittee prior to the next meeting. This Working Group needs more data from manufacturers in order to establish limits.

   b. P 1258 - Silicone Gas Guide

      Jim Goudie is heading the activity of collecting data to establish recommended limits and to prepare Draft 2 of this guide. They plan to circulate Draft 2 to the subcommittee members prior to the next meeting. This draft will be changed significantly from the previous draft, and they will attempt to prepare tables and recommended levels.

This concluded the business for the Insulating Fluid Subcommittee at this session.

Henry Pearce, Chairman

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.9 INSULATION LIFE - D. H. Douglas

MEETING MINUTES INSULATION LIFE SUBCOMMITTEE
OF THE IEEE TRANSFORMERS COMMITTEE
AT THE RED LYON LLOYDS CENTER HOTEL PORTLAND, OREGON

The Insulation Life Subcommittee met on Tuesday, March 30, 1993, at 10:55 A.M. There was a total attendance of 83 consisting of 39 Subcommittee Members and 47 Guests.

After introductions were made, the minutes of the previous meeting in Cleveland were approved as issued.

The Chairman then welcomed eight new members to this fast growing Subcommittee. They are:

Don Ayers -	Westinghouse Corp., Charleston, S.C.
Barry Beaster -	ABB, Muncie Ind.
Don Cash -	Consultant
Jerry Corkran -	Cooper Power Systems, Waukesha
Alvin Martinez -	Entergy - New Orleans
Mike Mitelman -	GE Hickory
Dan Perco -	ABB Guelph, Canada
Steve Smith -	Kuhlman, Versailles, KY

After a report on several items from the Administration Subcommittee Meeting, the reports from the 4 Subcommittee Working Groups were given:

1. Lin Pierce, Chairman of the Working Group on Guides for Loading, reported that they met on Monday morning at 8:00 A.M. for a double session with an attendance of 69 consisting of 40 members and 29 guests.

   Lin Pierce thanked and commended Dave Takach, the outgoing working group chairman, for compiling draft 10 of the new loading guide and mailing it to the working group and subcommittee with the ballot. This is a massive document consisting of 31 pages in the main document and 87 pages of appendices, for a total of 118 pages. Again, in this document, we are trying to combine loading guides for distribution, medium and very large power transformers.

Ballot results for draft 10 were as follows:

Mailed	98
Returned	64 (61.2%)
Negative	8
Abstain	4
Approved	41
Approved with comments	11

Since the percent returned did not reach the required 75%, the ballot deadline was extended 60 days to May 11, in accordance with IEEE standard procedures. W. G. members who do not return ballots will be dropped from the W.G. membership list.

The entire Working Group meeting was devoted to reviewing negative ballot comments and comments from "Approved With Comments" ballots:

A summary of some of the negative ballot comments and their resolution are as follows:

a. It was recommended that the variations in ambient temperatures and the effect of load tap changer tap changes be considered in the calculation of transformer temperatures.
b. A warning be included that the alternate equations in Appendix G may not be equally valid for all distribution and power transformers.
c. A note should be included indicating that, in some cases, the total tank and fittings weight is not the appropriate weight to be used in the transient thermal equations.
d. In determining the reduction in transformer capability, due to loss of fans, the % cooling capacity reduction should be used rather than the number of fans that are not operative.
e. The effect of the N2 blanket in Appendix A is in error as determined by a recent EPRI project. Stan Lindgren will supply the reference EPRI report and the error will be corrected.
f. Reference and use of the "magic number" of 140°C for gassing should be corrected to conform to recent EPRI R&D results which indicated that very dry insulation will not gas even at 140°C.

The comments received with negative ballots and all other comments received will be addressed in Draft 11 of the guide, which will be sent out for balloting about mid May.

The deadline for return of ballots will be shortened to 4 weeks in order to expedite completion of the work on this document.

The W/G meeting adjourned at 10:10 A.M.

2. The second report was given by Bob Grubb, Chairman of the Working Group on Thermal Tests. They met at 1:20 P.M. on March 29, 1993, with 15 members and 19 guests in attendance.

The first order of business was a status review, followed by continuing working discussion on Project P838/ANSI PC57.199, Recommended Procedures for Performing Temperature Rise Tests on Oil Immersed Power Transformers at Loads Beyond Nameplate Rating. At the previous meeting, a 10 page compilation of comments received with the negative and positive ballots of Draft 12 had been circulated by the Chairman. In two working sessions at that meeting, consensus was reached on proposed resolution of most of these comments. It was anticipated that Working Group members would review those comments not covered and be prepared to discuss them at this meeting.

The major item of discussion was the continuing issue of whether to leave cooling equipment (both pumps and fans) on or off during the shutdown for resistance measurement. Discussion pointed out the dilemma that the test method is intended to supply information both on the winding temperature at the time of shutdown, and on the winding time constant; and that keeping cooling on could in some cases sacrifice the ability to accurately calculate winding temperature, while turning cooling off will sacrifice accurate calculation of the time constant.

The Chairman pointed out that since the last meeting Magnetek had performed several temperature rise tests on forced cooled transformers varying the status of fans during shutdowns for resistance measurements and asked Subhash Tuli to give a brief report on their findings. Their findings were that the status of the fans during shutdown had little, if any, impact on the measurements and calculation of winding temperatures.

The consensus of the Working Group was that the document indicate the following:

a. Cooling (pumps and/or fans) can be left either on or off during shutdowns.

b. Discussion of the possible inaccuracies of each method.

c. A cautionary statement suggesting that a static ground can be used to protect test personnel from discharges.

The Chairman then asked if there was any additional discussion from the Working Group related to the compilation of comments from Draft 12. There was none. It was proposed that Draft 12 be revised to include the suggested changes from those comments, together with any items of resolution from Working Group sessions, and that the revised draft be submitted for re-ballot to the Subcommittee and that re-ballot to cover only the revised sections.

The next item of business was a status report on Project PC57.12.00L, Definition of Thermal Duplicate. When the Task Force met in Cleveland, most of the issues related to questions on the proposed Draft 2 of the definition had been resolved, and it was planned to ballot that Draft in the Working Group. Due to other priorities and to the difficulty in finding a volunteer to chair this Task Force, that ballot was not sent out. Since the Draft is essentially ready to be balloted, the Task Force did not meet in Portland. Bob Grubb, because of his heavy workload, once again asked for a volunteer to chair this Task Force. Barry Beaster of ABB agreed to take on Chairmanship of the Task Force. It is expect that the Draft 2 will be balloted before the next meeting.

There being no other items of old or new business, the meeting was adjourned at 2:30 P.M.

3. The next report was given by Larry Lowdermilk, Chairman of the Working Group on Thermal Evaluation of Liquid Immersed Power & Distribution Transformers.

The Working Group met at 2:50 P.M. on Monday, March 29, 1993, with a total attendance of 38, including 8 Working Group members and 30 guests.

The ballot results from Draft 2 of the proposed standard entitled "Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution and Power Transformers" were reviewed with the following results. Fifty-one out of seventy-two ballots were returned for a return of 70 percent. This was 3 votes short of the 75% needed for a successful ballot. Out of the 51 ballots returned, 43 were affirmative, 3 were negative, and there were 5 abstentions.

The Working Group then reviewed and discussed numerous comments which were returned with both the affirmative ballots as well as with the 3 negative ballots returned. Many of the comments addressed were editorial and typographical modifications that need to be made for Draft 3.

The major substantive change recommended pertains to the criteria to be used in demonstrating attainment of a minimum life expectancy of 180,000 hours at the continuously rated hottest spot temperature. Bill McNutt commented that the proposed requirement of "five times the life expectancy" is inappropriate for power transformers. He further commented that in the precedent EPRI life test programs, the duration of the GE tests at 180°C were about 1.5 times the duration required to demonstrate 180,000 hours life at 110°C, while in the Westinghouse program the duration was about 2 times the required life duration at 180°C. Since five times required life has never been demonstrated on power transformer models, Bill suggested that a duration of two times that required to demonstrate 180,000 hours life be specified.

All the comments received from the balloting and the modifications discussed during the Working Group meeting will be incorporated into Draft 3 of the standard. The Working Group and the Insulation Life Subcommittee will then be re-balloted in time to have the results discussed at the next meeting in St. Petersburg.

There being no new business, the Working Group meeting was adjourned at 4:05 P.M.

4. Heintz Fischer, Chairman of the Working Group on High Temperature Insulation for Liquid Immersed Transformers, reported that the Working Group met at 10:55 A.M. on March 29, 1993, with 29 members and 26 guests present.

After introductions, the minutes of the October 19, 1992, meeting in Cleveland were approved.

The Chairman reported that since the last meeting, Draft 7/Revision 2 of the "Background Information" paper was successfully balloted in both the Working Group and the Insulation Life Subcommittee.

It was noted that the Draft 6 negative ballot comments by Frank Heinricks had been resolved and the appropriate changes had been incorporated in Draft 7.

It was further noted that Olin Compton's concern that proper balloting procedures for publication of a Working Group "background information" paper were not being followed had been reviewed with Jim Harlow and the IEEE headquarters staff. The correct current procedures have been followed. With present approvals by the Working Group and Subcommittee, the paper will be circulated to the Main Transformers Committee for comments. After consideration of these comments by the Working Group, the final draft paper will be forwarded to the IEEE Technical Publications Dept. for presentation at the 1994 Winter meeting and publication in the Transactions. This paper will not be counted as part of the Transformers Committee allotment.

The next item of business was review of a Table of Contents for a "Guide for the Application of High Temperature Insulation Materials in Liquid Immersed Power Transformers." This had been assembled based on contributions from Chuck McMillen, Frank Heinricks, and other Task Force members. Minor refinements were made as the result of comments at the meeting, and the revised Table of Contents will be attached to these Minutes. It was noted that inputs on high temperature fluids will be requested from the Insulating Fluids Subcommittee.

There being no further old business and no new business, the meeting was adjourned at 12:00 noon.

Under "Old Business" the Subcommittee Chairman indicated that three meetings ago a request was made of the Subcommittee to look into the effect of voltage stress on insulation life.

The Chairman asked Bob Veitch to review the results of studies made at Ferranti Packard over a period of time on this subject. These results were reported at a 1979 EPRI Workshop. He reviewed two curves showing the effect on insulation life, measured by degree of polymerization, for variations in temperature and voltage stress. The test samples were made from magnetic wire which was electrically stressed within a sealed tank with oil maintained at a constant temperature. The results show some reductions in insulation life when voltage stresses of from 30 to 100 volts/mil of insulation thickness are applied. These voltage stresses are not uncommon in some power transformers. Bob's report will be attached to the Subcommittee Minutes.

A hand vote of the Subcommittee indicated an interest to set up a Task Force to continue investigation into this phenomenon. Mike Mitleman indicated an interest in this subject, and agreed to chair this W/G. He also received several volunteers to work on this Task Force which will meet at our next meeting in St. Petersburg.

Under "New Business" Bob Grubb requested guidance from the subcommittee on establishing an improved method for identifying or testing for winding hottest spot temperature. He indicated that the following are four methods now being used.

a. Hottest spot testing using fiber optic probes.
b. Calculation by the manufacturer using design test data.
c. The method used in the IEC Loading Guide.
d. The current method used in the ANSI Loading Guide, namely adding in a 15°C hot spot allowance to the average winding temperature no matter what the type of transformer.

Since winding hottest spot temperature is a key factor in the determination of transformer allowable loading, their was much interest in the subcommittee for establishing an improved method over what is now used in the ANSI loading guide. Sometimes it is easy to become dependent on the reading of the hot spot device on the transformer, forgetting sometimes that this is only a simulation, not a actual measurement of winding hot spot.

A Task Force will be set up under the Thermal Test Working Group. About 10 volunteers came forward to work on the Task Force, which will meet at the next Transformer Committee meeting in St. Petersburg.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.9 INSULATION LIFE SUBCOMMITTEE - (Cont'd)

There being no further business, the Subcommittee Meeting was adjourned at 12:10 P.M.

Respectfully Submitted by:
D. H. Douglas
Subcommittee Chairman

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.10 PERFORMANCE CHARACTERISTICS - J. W. Matthews

April 2, 1993
Performance Characteristics Subcommittee Meeting Minutes
Portland, Oregon - March 30, 1993

1. Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met at 2:00 p.m. on Tuesday, March 30, 1993, with 39 members and 21 guests in attendance.

2. Approval of Minutes

The minutes of the October 20, 1992, PCS Meeting were approved as written.

3. Chairman's Remarks

a. Administrative Subcommittee Notes

The following information was obtained at the March 29, 1993, Administrative Subcommittee meeting:

1. Future Committee meetings are scheduled as follows:

Fall 1993	-	St. Petersburg, FL - Oct. 31-Nov. 3
Spring 1994	-	Dallas, TX - Mar. 20-23
Fall 1994	-	Milwaukee, WI - Sept. 24-28
Spring 1995	-	Kansas City, MO
Fall 1995	-	Boston, MA - Nov. 5-9
Spring 1996	-	San Francisco, CA

2. The Transformers Committee Operating Manual is being revised to the pattern and dictates of the new Technical Council Organization and Procedures Manual published in 1992.

3. Jim Harlow has again requested presentation of a tutorial or panel session at the T&D Conference in Chicago in April, 1994. Notify Jim or me, if you have an interest.

4. Standards Coordination Notes:

The Standards Submittal Kit, provided by the Standards Office, has now been divided into three parts:

- Standards Starter Kit
- Standards Board Submittal Kit
- Post Project Kit

Contact Luigi Napoli at (908)562-3812 for the most recent kit before beginning a project.

I announced at the last PCS meeting that we have blanket approval to use IEC copyrighted documents in development of IEEE Standards. We have now been informed that two items are required with this approval. (See Attachment 7.10.A.)

A status report on all PCS projects is attached. (Attachment 7.10.B)

b. Membership

Jim Arnold was reinstated. Dieter Dohnal (Reinhausen), Frank McCann (Consultant), and Joe Vaschak (Westinghouse) were added to the roster. Olin Compton, P. Manos, J. Murphy and Len Swenson were removed from the roster. Membership stands at 85.

c. Miscellaneous

Linden Pierce has received a letter from Mr. Lawrence Gradin of ECOTECH/RAM-Q Industries regarding a possible error in the newly published IEEE Std. 638 - Qualification of Class 1E Transformers. Linden will review this item, prepare a response, and recommend any required action.

4. Agenda Changes

A request to consider revision of C57.12.90, Part II Low Voltage Impulse Tests, was added as the third item of New Business.

5. Working Group Reports

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

The Working Group met on Monday, March 29, 1993, at 8:00 a.m. and 9:30 a.m. There were 18 members and 13 guests present.

Minutes of the October 19, 1992, meeting in Cleveland, Ohio were approved.

Roger Hayes was to provide wording regarding the proper calculation of load losses with various circuits incorporating paralleled primary windings. As Roger was absent from the meeting, this will be postponed until the next meeting.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.10 PERFORMANCE CHARACTERISTICS SUBCOMMITTEE (Cont'd)

Chairman Sheldon Kennedy had agreed to revise Table 11 of the Appendix to reflect RMS per-unit currents as opposed to fundamental per-unit currents. This was presented to the Working Group for consideration. The calculations are all based on the theoretical values of harmonic currents which occur only at no load conditions. This presents an unrealistically high value of per unit currents. The per unit values should reduce as load increases. High values of both fundamental K-factors and RMS K-factors are produced by this method. An error was also pointed out in the 3 pulse calculations. After much discussion, it was decided to not use Table 11 as a "default" harmonic spectrum when none was provided by the user. It was felt that the harmonic spectrum should be specified by the purchaser, not the transformer standard. IEEE 519 should be referred to for guidance. Various rectifier and drive circuits produce different harmonic spectrums even when they are of the same pulse order.

It was also decided to allow the Working Group of C57.110 provide the definition of K-factor (or whatever term they decide to use). This will designate the value by which eddy and stray losses are multiplied due to harmonics. An example of the calculation of this factor utilizing IEEE 519 may be included in an Appendix.

Discussion next turned to the IEC Converter Transformer Standard Draft, as it relates to our rectifier transformer draft. Our standard should use guaranteed sinusoidal losses, as they are measured today, for the purpose of commercial guarantees. This would harmonize with IEC. Service losses would still need to be determined. The enhanced harmonic losses would be added to the sinusoidal losses during temperature rise tests. This will not produce the harmonic losses in the proper regions of the transformer where they will develop. However, the approximate overall temperature rise of the windings and liquid (if applicable) should be reasonably accurate. A caveat should be made, however. The hottest spot temperature must still be kept within the limits of the insulation system under the service conditions. This cannot be determined by this test. The manufacturer still has responsibility for this characteristic. The alternate method to this test is to use a converter system or load bank to perform this test. In many cases, this is impractical.

It was also noted that the IEC draft offered a method for performing total loss injection tests on single way transformers. This can be done, but the results aren't always accurate. The more accurate way to perform this test is as a combinational test with the rectifier.

Don Kline submitted a paper to the Working Group regarding transformer K-factors. This will be distributed to the Working Group for review.

Sheldon Kennedy also reported that the Insulation Life Subcommittee has been approached regarding this application of the loading guides to rectifier transformers. The wording in our draft will be revised. For calculations involved in determining loss of life, the appropriate loading guides may be used with considerations. Temperature rise is to be based on the rise,using losses which reflect the load losses enhanced with harmonic losses. Temperature gradients, including hottest-spot temperature allowances, should be those associated with the enhanced harmonic losses as service conditions. These losses are calculated in section 8.6. The referral to an appendix of "Special Calculations," will be removed. When the ballot passes through the main committee, this will be reviewed.

Several members of the Working Group expressed their opinion that the IEC loss calculation method, or one similar to it, should be adopted in this standard. The present method has its basis in C57.110. It was not possible to get a direction from the general membership, however, as most had not reviewed the distributed IEC draft. The Working Group members will be approached between now and the next meeting on this matter.

The meeting adjourned at 10:45 a.m.

At the end of the meeting, John Crouse requested membership in the Working Group.

b. Revision C57.109 - B. K. (Bipin) Patel

The Working Group met on March 29, 1993, at 4:15 p.m. with 9 members and 4 guests present.

After normal introduction, the minutes of the Cleveland, OH meeting were approved as written.

The Chairman briefed the Working Group as follows:

Draft #5 was circulated in the Main Committee on November 19, 1992, for a thirty-day review as was discussed at the Performance Characteristics Subcommittee Meeting in Cleveland, OH. Only two responses were received - one indicating approval without comment and the other making a minor editorial comment. Draft #5, after the minor editorial change and reformatting per the IEEE Standards Style Manual, was submitted to the IEEE Standards Board for approval on February 2, 1993.

By a phone call to the IEEE center on March 22, 1993, it was learned that Draft #5 was approved by the RevCom at their meeting on March 19, 1993. The IEEE Standards Office will assign an editor to this draft for its publication.

There was no old or new business brought up for discussion.

The meeting adjourned at 4:27 p.m.

Bipin added that as the work on this project should be complete, no meeting is planned for St. Petersburg. He also thanked the Subcommittee for promptly responding to ballots on this project.

The PCS Chairman then thanked Bipin for his excellent leadership on this project.

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

The LTC Performance Requirements Working Group met at 1:20 p.m. on Monday, March 29, 1993, with 14 members and 24 guests in attendance.

The main topic of discussion was Annex (formerly Appendices) B of the proposed new standard C57.131, Standard Requirements for Load Tap Changers. Significant changes to this Annex were suggested by Working Group members after the last Working Group meeting and also after a successful ballot had already been obtained from the Performance Characteristics Subcommittee. The changes were considered by the Chairman to be very worthwhile, and would make the Standard a more valuable document. They have, therefore, been incorporated into the proposed standard. This means, however, that the revised Annex will have to be submitted for re-ballot to the Performance Characteristics Subcommittee.

Additional phasor diagrams, operating sequence diagrams and switching tables, showing the switched current and recovery voltage, for load tap changer operation have been added to Annex B which covers reactance type LTC's. Following discussion of these items, it was agreed that switched current, but not load current, and recovery voltage, but not the steady voltage across open contacts, would be shown in the switching tables. Other changes of an editorial nature were also discussed and adopted. The Chairman will request permission to reballot the Performance Characteristics Subcommittee on the revised Annex B along with Annexes A&E, which were also slightly changed.

The Chairman agreed to contact the Chairman of the Dielectric Tests Subcommittee to establish coordination since the new standard contains dielectric test requirements for load tap changers. The meeting adjourned at 2:15 p.m.

Following the Working Group meeting, I attended the meeting of the Revision of Dielectric Tests Working Group. Under "New Business" I explained the need to establish coordination with either that Working Group or with the Dielectric Tests Subcommittee, whichever is appropriate. The Chairman of the Revision of Dielectric Tests Working Group agreed that such coordination is desirable and that the dielectric test portion (5 of 61 pages) should be balloted by either his Working Group or by the Dielectric Tests Subcommittee. He agreed to bring up the subject at the Subcommittee meeting. At this morning's meeting of the Dielectric Tests Subcommittee, it was decided that the necessary coordination would be provided by submitting the dielectric test portion of the new standard to the Revision of Dielectric Tests WG for their review and approval. This will be done within the next few weeks. If successful ballots are obtained from the WG (on dielectric tests) and from the S.C. (on the revised annexes), it may be possible to submit the entire document to the Transformers Committee for its approval prior to the next meeting.

Approval to ballot Performance Characteristics Subcommittee (Annexes A, B & E only), was granted by PCS Chairman following this WG report.

d. Failure Analysis - M. S. (Mike) Altman

The Working Group met at 1:20 p.m. on Monday. The only topic of discussion was the progress of the Task Force for the Survey on GSU Transformers.

The Task Force met on Sunday, March 28, 1993, at the Red Lion in Portland, OR from 3 to 5 p.m. with 10 members and 10 guests in attendance and also shortly on Monday during the Working Group meeting. At our next meeting, in the Fall, this group will meet only on Monday during the WG meeting. No objections were made to the Cleveland minutes, therefore, they were approved as written.

After general discussion regarding this subject, we now have a cover letter to be sent along with a request for information regarding failures of GSU transformers above 100 MVA that have failed since 1980. This is to be sent to utilities on a combination list of the IEEE Transformers Committee and the Electrical System and Equipment Committee of the Edison Electric Institute.

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)
7.10 PERFORMANCE CHARACTERISTICS SUBCOMMITTEE (Cont'd)

At the Sunday meeting, discussion resulted in consultation with the Subcommittee Chairman. Before work was to progress, we were to determine what form of output the survey would take and how distribution would be accomplished. It was thought that perhaps IEEE headquarters would lend assistance in these matters. Discussion between the Task Force Chairman and the Subcommittee Chairman resulted in the conclusion that these matters would be resolved within the task force.

This work is now moving forward.

e. Revision C57.110 - R. P. (Rick) Marek

The Working Group met at 4:15 p.m. on March 29, 1993, in Portland, OR with 14 members and 24 guests present. Eleven guests requested membership in the WG.

In reviewing the minutes of the October, 1992 meeting, discussion was held concerning the accuracy of item 4 which read: "arrive at a symbol other than "K" to designate the value by which the eddy and stray losses are multiplied due to harmonics." The discussion centered around eliminating the phrase "other than 'K'." After some discussion, it was agreed that the minutes accurately reflected what was said in the Cleveland meeting and the minutes were approved as written.

The next item was a discussion of the Par. The Chairman informed the group that the purpose of the PAR was to clearly identify the project title, scope and purpose.

1. In trying to define the scope, it was noted that the current scope specifically excluded transformers below 600 volts and also rectifier transformers. After some discussion as to why 600 volt transformers were originally excluded, a motion was introduced to add NEMA ST-20 to the referenced list of standards. The motion was approved by voice vote. The next item discussed was the exclusion of rectifier transformers. As part of this discussion, Sheldon Kennedy summarized his meeting on C57.18.10 for the group. It was stated that rectifiers were originally excluded from this standard due to the fact that this standard was used to derate existing transformers due to harmonic loading and transformers being designed for a rectifier load were not to be derated, but designed to accommodate non-sinusoidal loads at nameplate kVA. After this discussion, a motion was made to include C57.18.10 in the referenced list of standards. A motion was carried by voice vote.

At this point, the proposed new scope was read by the Chairman and a discussion ensued over why the upper limit was 50 MVA and why the harmonic content was greater than 0.05 per unit. After some discussion, it was decided to eliminate these restrictions as they were unnecessary. The new scope reads as follows: "This recommended practice applies to all transformers covered by ANSI/IEEE C57.12.00, C57.12.01, NEMA ST-20, and ANSI/IEEE C57.18.10 when subjected to non- sinusoidal load currents. There was some discussion after the scope was read whether it was correct to eliminate the statement "having a harmonic factor exceeding 0.05 per unit." It was finally agreed upon to accept the scope as stated.

2. The next item discussed was the purpose. The current purpose from C57.110 was read by the Chairman. It was decided for the purpose of the PAR that the purpose should be shortened to: "The purpose of this document is to establish uniform methods for determining the capability of transformers to supply non-sinusoidal load currents of known characteristics.

3. Title - There was some discussion as to whether or not the document should be changed from a recommended practice to a standard. It was decided to leave the document as a recommended practice with the stipulation that the PAR would be revised at a later date if required.

The next item on the agenda was new business. The following were the items brought up during this discussion:

Since the document was now going to include newly manufactured transformers, test methods should be addressed in the document.

It was indicated that a suggestion was made to significantly revise the tutorial at the end of the document. The Chairman recommended that this item be held for later discussion.

The Chairman suggested that the WG make major changes to the format and the headers in the document in order to make it easier to use.

It was pointed out during discussions that the IEEE Standards Board will, at times, make editorial changes without re-issuing the document. It was therefore decided that the Chairman will obtain the latest copy of the standard from IEEE and distribute it to the members of the WG.

It was also pointed out that during the previous balloting for reaffirmation of C57.110, 3 negative ballots were received; however, they were waived in order to re-affirm the document but need to be addressed by this WG.

The final item of new business was a discussion of the term "K" factor and its usage. It was pointed out that in the loading guides "K" is used for per unit load, (the ratio of load L to rated load). A discussion followed as to what should be used in this standard. Some of the recommendations were "H" factor, "HL factor" and others. No decision was made, and the discussion will continue at the next meeting.

Meeting was adjourned at 5:25 p.m.

Since this meeting, the WG Chairman has initiated the set-up of four Task Forces to handle New Design Procedures, Derating Existing Transformers, Test Procedures and the Tutorial. Chairmen have volunteered for all except the New Design Procedures.

It was also noted by the PCS Chairman that the present C57.110 Std. was reaffirmed at the December 1992 Standards Board Meeting.

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

The WG on Loss Tolerances and Measurement met on Monday, March 29, 1993, at 2:50 p.m. with 13 members and 26 guests present. Minutes of the previous meeting, held on October 19, 1992, were reviewed and accepted.

The first item of business was a report by the Power System Instrumentation and Measurement Task Force on Low Power Factor Power Measurement. Eddy So chairs this task force. The task force is writing a guide to cover instrumentation used to measure power loss in low power factor devices, such as transformers, reactors, capacitors and cables. Draft 3 of the guide was reviewed. The writing of this guide is being coordinated with the preparation of a loss measurement guide for transformers.

The loss measurement guide for transformers is being prepared by a task force chaired by Ramsis Girgis. At this task force meeting, held on Sunday afternoon, Draft 8 of the no-load loss portion of the guide and Draft 1 of the load loss portion of the guide were reviewed. Draft 9 of the guide will be balloted in the WG and within the task force next month.

At the Working Group meeting, after the task force reports, two other topics were covered. The first was a discussion of a negative vote on the loss measurement proposal, objecting to the 5% limit imposed on the magnitude of the correction for phase-angle error. We agreed at the beginning of the discussion that we would probably not resolve the issue at this meeting. And we did not resolve the issue at the meeting. However, a proposal will be prepared and balloted in the Working Group to attempt to resolve it through further clarification of why the limits are imposed and under what conditions they shall be imposed.

The second topic discussed at the WG meeting was also in response to a negative vote on the load loss measurement proposal. In this case, we are being asked to consider a proposal to provide a connection procedure for the power loss in the shorting connection across windings rated less than 2 kV. The present test code simply states that the cross-sectional area of the conductor used in the shorting connection shall be at least equal to the cross-sectional area of the transformer leads. This admonition is not sufficient for some ratings at low voltages of 2 kV or less, such as those found in distribution transformers. Oleh Iwanusiw has prepared a proposal for a correction method that will be balloted among working group members next month.

The meeting of the Working Group on Loss Tolerances and Measurement adjourned at 4:05 p.m. as scheduled.

6. Project Reports

a. Request for Addition of PCB Content to Nameplate Information in C57.12.00

In response to numerous items mentioned in discussion of this request (see Attachment 7.10.C), we have obtained the following revision:

Revise Table 9 - Nameplate information by adding an item "PCB Content" to each column.

Include a note stating:

"Since all transformer manufacturing facilities are required to use insulating fluids which have no detectable PCB content (less than 2 ppm PCB per ASTM D3487), the following statement shall be included on the nameplate of all transformers shipped oil-filled:

The insulating fluid contained less than 2 ppm PCB at the time of manufacture."

Volunteers to address this item were solicited at this meeting, but no one came forward. After the meeting, Chuck Murray volunteered to handle this project.

b. Revision of Cooling Class Designations in C57.12.00

A Task Force was formed at the last meeting to review this proposal. I was not able to coordinate this project as I had planned.

Don Platts has volunteered to lead the Task Force in this project and will report on progress at the next meeting.

7. Old Business - None

8. New Business

a. Request for Addition of Data Required on Manufacturer's Test reports in C57.12.90

This request from Lin Pierce (see Attachment 7.10.D) was made for the WG Guides for Loading to obtain additional test data required in loading calculations.

Peter Krause volunteered to work on this project.

b. Request to Add Rail Shipment/Seismic Design Information to Nameplate

Discussion of this item led to the consensus that this design information is more appropriately shown on drawings with other transportation and installation information.

The originator of this request was present during the discussion and agreed that no further action should be required.

c. Revision of C57.12.90 Part II - Guide for Short-Circuit Testing of Distribution and Power Transformers

Nigel McQuin made a request to revise Section 3.4 - Low Voltage Impulse Tests, to allow use of modern test equipment and methods. Discussion of this request led to the suggestion that this method of short-circuit failure detection may not even be required.

Nigel volunteered to survey the PCS for opinion as to whether this test should either be deleted, or revised and updated.

9. Next Meeting

The next meeting will be held on Tuesday, November 2, 1993, in St. Petersburg, Florida.

The meeting was adjourned at 3:15 p.m.

Respectfully submitted,
John W. Matthews PCS Chairman

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.11 UNDERGROUND TRANSFORMERS & NETWORK PROTECTORS - P.E. Orehek

UNDERGROUND TRANSFORMERS AND
NETWORK PROTECTORS SUBCOMMITTEE
MEETING MINUTES PORTLAND, OREGON
MARCH 30, 1993

1. Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met at 10:55 a.m. on March 30, 1993, with 13 members and four guests present. The attendance roster is attached.

2. Approval of Minutes

The minutes of the October 19, 1992, meeting in Cleveland, Ohio were approved as submitted.

3. Chairman's Remarks

a. Administrative Subcommittee Notes

1. NEMA is going to reestablish the document TR-1, probably in 1993. It will only be for items that stand alone, such as RIV or Noise Levels.

2. The Amendment of the Energy Policy and Conservation Act to investigate the efficiency of distribution transformers was discussed.

NEMA is to follow and prepare a reply for the industry with input from EEI. It was pointed out that Canada is already addressing the problem of transformer efficiency in response to the Energy Efficiency Act passed in 1988 by the Ontario Energy Ministry. They are trying to develop a standard which lists maximum losses per transformer type, kVA rating and voltage rating.

3. C57.12.90 was submitted to the IEEE Standards Board and approved on March 18, 1993.

4. The "IEEE/PES Technical Council Organization and Procedures Manual July 1992" was distributed to Administrative Subcommittee members. The Vice Chairman is working to incorporate the Transformers Committee Operating Manual into the pattern and dictates of the PES Manual.

5. The IEEE Standards Department reported that an agreement on the ANSI co-secretariat of Committees C37, C57 and C62 had been signed by both IEEE and NEMA. NEMA also agreed that the following standards be 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.

b. Membership

1. R. L. Plaster of ABB Power T&D Company became a new member of the IEEE Transformers Committee. Congratulations, Leon.

2. Membership was terminated for five members in the Subcommittee due to lack of participation.

Each person was sent a letter and asked if they desired to continue their membership and none responded. Present membership is now at 18.

4. Working Group Reports

a. Three-Phase Underground - Type Transformers(57.12.24)
J. W. Howard - Chairman

1. The Working Group met on Monday, March 29, 1993, at 2:50 p.m. with eight members and one guest present.

2. The minutes of the October 19, 1992, Cleveland, Ohio meeting were approved as written.

3. Draft No. 5 was balloted in the Main Committee. There were 88 affirmative votes, two negative and 14 abstentions out of 128 eligible votes. The ballot was 97 percent affirmative with a return of 81 percent.

4. One negative vote was resolved and the Working Group recommended overriding the other negative vote. Replies were sent to the objectors.

5. Other comments were received with affirmative votes. Some were able to be incorporated and others will be considered for the next revision.

6. Three members were terminated from membership in the Working Group due to lack of participation. They were all sent letters requesting if they desired to maintain their membership and none responded.

7. The Working Group meeting adjourned at 3:45 p.m.

b. Liquid-Filled Secondary Network Transformers (C57.12.40) E. A. Bertolini - Chairman

1. The Working Group met on Monday, March 29, 1993, at 4:15 p.m. with 11 members and two guests present.

2. The minutes of the October 19, 1992, Cleveland, Ohio meeting were approved as written.

3. Draft No. 3 was balloted in the Main Committee. There were 75 affirmative votes, two negative votes and 21 abstentions out of 128 eligible ballots. The ballot was 97% percent affirmative with a return of 76 percent.

4. The Working Group tried to resolve both ballots and was not successful. They therefore recommended overriding both ballots and sent replies to both objectors indicating their reasons. One comment recommended standardizing on lower BIL levels. Although this was overruled, the Chairman of the Working Group will send a letter to the appropriate Chairman of C57.12.00 recommending a note be included in C57.12.00 which effectively states that lower BIL ratings may require the use of additional system protective devices and may not be suitable for underground use.

5. The other no vote concerned specifying a safety margin between maximum operating pressure and maximum design withstand pressure of the tank. Although overruled, this will be considered in the future.

6. The meeting adjourned at 5:20 p.m.

c. Secondary Network Protectors (C57.12.44) R. B. Robertson - Chairman

1. The Working Group met on Monday, March 29, 1993, at 8:00 a.m. for four sessions with 14 members and two guests present.

2. The minutes of the October 19, 1992, Cleveland, Ohio meeting were approved as submitted.

3. The Draft of the proposed Standard has been completed. The Draft has been balloted in the Working Group and unanimously approved.

   Balloting in the Subcommittee has started and 13 affirmative votes have so far been received with five still outstanding.

4. The meeting adjourned at 2:35 p.m.

d. Dry-Type Network Transformers (C57.12.57) B. Nutt - Chairman

1. The Working Group met on Tuesday, March 30, 1993, at 8:00 a.m. with eight members and 10 guests present. Carl Niemann of Commonwealth Edison acted as Chairman since Bruce Nutt was unable to attend this meeting.

2. The minutes of the October 20, 1992, Cleveland, Ohio meeting were not approved since none had been published.

3. Draft No. 6 of this Standard was scheduled for balloting in the Working Group and Subcommittee but not yet completed. This should be done prior to the St. Petersburg meeting.

4. It was pointed out that Paragraph 2.1 of this Draft states that all subsequent revisions to referenced Standards that apply to this Standard would automatically apply. This is not in keeping with the other Standards the Subcommittee is responsible for, and it was voted upon to rewrite this paragraph to state that the revision shall not apply when an American National Standard referred to in this document is superseded by a revision approved by ANSI.

5. The meeting adjourned at 8:50 a.m.

5. New Business

a. The Transformers Committee Vice Chairman asked if the Subcommittee would be interested in sponsoring a panel session or tutorial at the T&D Exposition in Chicago in April, 1994. This generated much positive discussion within the Subcommittee, and it was recommended we sponsor a panel session. The topic suggested would include items related to Maintenance, Reconditioning Practices, Reliability and Design of Network Transformers and Network Protectors. A number of utility members and manufacturers expressed their interest in being part of a panel session. A program will be developed during the summer.

6. Future Meetings

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

October 31 - November 3, 1993	St. Petersburg, Florida
March 20 - 23, 1994	Dallas Texas
September 24 - 28, 1994	Milwaukee, Wisconsin
Spring, 1995	Kansas City, Missouri
November 5 - 9, 1995	Boston, Massachusetts
Spring, 1996	San Francisco, Ca.

The meeting adjourned at 12 noon.

Attendance Summary

	Present	Absent
Members	13	5
Guests	4	-

Respectfully submitted,
Paul E. Orehek, Chairman

7.0 REPORT OF TECHNICAL SUBCOMMITTEES (Cont'd)

7.12 WEST COAST - L. A. Tauber

No meeting was held by the West Coast Subcommittee.

8.0 REPORTS OF LIAISON REPRESENTATIVES - (Cont'd)

5. 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 project to better identify moisture conditions associated with bubbles and verify GE mathematical model was completed (Interim Report EL6761) but raised questions about nitrogen blanketed transformers.

- A final report (EL7291) covering more complete test data is published. A computer program covering bubble evolution plus the ANSI Loading Guide formulas is being developed as an EPRIGEM expected to be available 2nd quarter, 1993.

6. Active Transformer Noise Cancellation System:

- Only noise reduction in one direction has been pursued.

- An initial evaluation on a substation transformer was completed that demonstrated over 10 decibel reduction of 120 Hz with a small trial system.

- Two systems are being linked together to handle a larger transformer and improve reduction of higher frequencies.

- A field demonstration is under way.

7. 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 is underway to study fast disconnect switching transient effects on HVCTS. Mathematical modeling will be checked experimentally through laboratory tests and switching tests in a 500 kV substation.

8. Power Transformer Tank Rupture - Risk Assessment and Mitigation

This project has been completed except for final report. Over 20 well documented cases have been collected from which several were selected for detailed study.

8.0 REPORTS OF LIAISON REPRESENTATIVES - (Cont'd)

9. Geomagnetic Induced Currents (GIC)

EPRI has three projects underway.

- A feasibility demonstration is in process for detection of transformer core saturation at twenty locations and reporting to a central location. Useful data was collected from several GIC events. The system is being expanded to 24 locations.
- Two transformer neutral GIC blocking devices were installed in 1991 and preliminary field trials were performed with good results in June 1991.
- A project to evaluate the response of protective relaying systems to GIC has been completed. A final report is in progress.

10. Thermal Models for Real-Time Monitoring

This new project is under way involving all transmission components including power transformers. This involves software development and a field test involving two substations on a utility system.

8.2 Discussion of Other Liaison Reports (Standards Coordinating Committee)
P. A. Payne, L. B. Wagenaar

IEEE/PES Winter Power Meeting
COLUMBUS, OHIO
FEBRUARY 1, 1993

1. Standards Coordinating Committee No. 4

Due to the retirement of P. Alexander, the committee has a new chairman, R. Weddleton.

The following Standards have been reaffirmed:

IEEE 1 "General Principles for Temperature Limits in the Rating of Electrical Equipment and for the Evaluation of Electrical Insulation"

IEEE 96 "General Principles for Rating Electric Apparatus for Short-time, Intermittent or Varying Duty"

IEEE 943 "Guide for Aging Mechanisms and Diagnostic Procedures in Evaluating Electrical Insulation Systems."

An extension has been obtained for completion of IEEE 97, "Recommended Practice for Specifying Service Conditions in Electrical Standards;" the draft standard is expected to be completed in March 1993. The chairman for revision of IEEE 97 is R. Flaherty.

The reaffirmation of IEEE 98, "Standard for the Preparation of Test for the Thermal Evaluation of Solid Electrical Insulating Materials," was rejected due to the request to change the title. The request for reaffirmation will be resubmitted.

Project authorization requests will be prepared for IEEE 1, 98 and 99. IEEE 99 is the "Guide for Aging Mechanisms and Diagnostic Procedures in Evaluating Electrical Insulation Systems."

2. Insulation Systems USA - USNC Technical Advisory Group for IEC Technical Committee 63: SCC4.1

The USNC was voted in as a member of the Committee of Action at the Rotterdam meeting. TC-63, Insulation Systems Technical Committee, was disbanded as the committee was unsuccessful in committing a Chairman and Secretariat by the October 1992 deadline. A working Group will be formed at the June meeting in Frankfurt under TC-15, Insulation Materials to continue TC-63 activities. Before disbandment, TC-63 was working on IEC-505, "Evaluation and Identification of Electrical Insulating Systems. The Committee Draft for 505- 1, "General Principals and Guide to Application," and most of its annexes has been prepared.

Considerable time was spent in the SCC4.1 meeting reviewing two proposals for continuance of TC-63 work, specifically the editing of a request for a new Technical Committee to handle the disbanded TC-63 work. We were able to achieve a consensus on this request which will better empower the new technical committee within a broader scope. The scope is summarized as follows:

"The proposed documents are intended to standardize on several aspects of electrical insulation systems (EIS), including testing; test specifications for establishing thermal classes; standards for functional testing, characterization and identification of EIS; and formation of principles and test methods for evaluation of EIS."

Lastly, SCC4.1 is recommending to the USNC a new Technical Committee for Insulation Systems with the United States as the Secretariat.

9.0 NEW BUSINESS

A question regarding the use of the IEEE Bulletin Board System was asked. The Secretary agreed to contact IEEE and incorporate the information they provide in the minutes. The following information was obtained:

STANDARDS PROCESS
AUTOMATION SYSTEM
Global Access to Computer-Aided Standards Development

The IEEE's Standards Process Automation (SPA) system is ready for users. It will ultimately serve as the communications hub for a range of IEEE Standards activities, including the actual creation and distribution of IEEE Standards. Eventually, Working Groups will run special software residing on the system to create IEEE Standards in an electronic format consistent with the information strategy of the IEEE Standards Program. In addition, callers will eventually be able to read and purchase documents so created.

This system supports two basic types of users: guests and registered users.

Guests

Anybody can call the system, log in as "guest," and have access to a growing collection of public files - everything from the catalog of IEEE Standards publications to electronic-publishing information from a variety of sources.

Registered Users

Registered users have access to the public file areas plus other areas, depending on the "groups" to which they belong. Members of IEEE Standards committees have separate areas on the system as well as access to electronic mail and other features.

What You Need

- a computer (any type)
- a modem (from 2400 bps up to 14.4K bps - V.32bis)
- communications software

How to Connect to the System

1. Set up your modem and communications software according to your documentation.

2. Set your communications software for even parity, seven data bits, and one stop bit (E71), and for a VT100 terminal emulation.

3. If you have a 2400-bps modem, call 908-981-0290. If you have a faster modem, call 908-981-0035.

IEEE/PES TRANSFORMERS COMMITTEE ATTENDANCE STATISTICS

GROUP	Denver Mar. 1990	Montreal Oct. 1990	Phoenix May 1991	Baltimore Nov. 1991	Birmingham Apr. 1992	Cleveland Oct. 1992	Portland Mar. 1993	MAX	AVG
Committee Registration: Members and Guests	202	257	237	247	285	245	213	285	241
Spouses	52	74	63	59	45	40	48	74	54
Luncheon	110	128	140	117	138	120	112	140	124
SC ADMINISTRATIVE	20	24	19	21	18	18	16	24	19
SC AUDIBLE SOUND AND VIBRATION	26	19	0	25	36	0	26	36	19
SC BUSHINGS	16	23	26	37	31	22	17	37	25
WG Bushing Application Guide	21	29	25	19	21	27	21	29	23
WG DC Applications of Bushings	12	14	13	14	15	12	17	17	14
WG Revision C57.19.01				11	15	13	12	15	13
SC DIELECTRIC TESTS	81	88	78	72	93	104	88	104	86
WG Revision of Dielectric Tests	33	35	48	53	56	58	40	58	46
TF Rev. of Impulse Test Guide	41	55	38	47		45	49	55	46
TF on Revision of the Induced Test	16		22	25			25 *	25	22
TF Metal Oxide Surge Arrester Coordination						27	27 *	27	27
WG Rev. Dielectric Tests on Distr. Transf.	28	30	27	21	29	19	17	30	24
TF Low Side Surge Req. for Distr. Transf.	26	19		25				26	23
TF Rev. Distr. Impulse Guide				25				25	25
WG Partial Discharge Tests	44	24	42	67	46	40	66	67	47
TF Acoustic Detection of Partial Discharge	22		20	22				22	21
TF Measurement of Apparent Charge	13	16	17	22				22	17
SC DISTRIBUTION TRANSFORMERS				34	28	35	35	35	33
WG Overhead Type Distr. Transfs. C57.12.20					23	23	23 *	23	23
WG Single-Phase Live Front Padmount C57.12.21					14	14	14 *	14	14
WG Three-Phase Live Front Padmount C57.12.22					15	15	15 *	15	15
WG Single-Phase Submersible C57.12.23					0	0	0 *	0	0
WG Single-Phase Deadfront Padmount C57.12.25					28	28	28 *	28	28
WG Three-Phase Deadfront Padmount C57.12.26					0	0	0 *	0	0
WG Bar Coding						0	0 *	0	0
WG Joint C57/37 on Cabinet Integrity C57.12.28					0	0	0 *	0	0

NOTE: Data maintained for four years only.

*=estimated

IEEE/PES TRANSFORMERS COMMITTEE ATTENDANCE STATISTICS

GROUP	Denver Mar. 1990	Montreal Oct. 1990	Phoenix May 1991	Baltimore Nov. 1991	Birmingham Apr. 1992	Cleveland Oct. 1992	Portland Mar. 1993	MAX	AVG
SC DRY-TYPE TRANSFORMERS	28	31	32	29	42	26	39	42	32
WG Test Code C57.91	28	29	28	22	31	25	31	31	28
WG Dry-Type Dielectric Problems	25	21	29	0	0	0	0	29	11
WG Dry-Type Reactors	12	10	9	12	15	9	12	15	11
WG Dry-Type Thermal Eval. and Flammability	22		28	0	27	16	26	28	20
WG Dry-Type Thermal Problems	27	24	29	0	0	0	0	29	11
WG Insulation Req. for Specialty Transf.	10	10	19	12	20	11	6	20	13
WG Cast Coil Loading Guide		20	30	22	25	19	30	30	24
SC HVDC CONVERTER TRANSFS. AND REACTORS	15	15	11	9	11	13	19	19	13
SC INSTRUMENT TRANSFORMERS	11	22	13	22	23	26	21	26	20
SC INSULATING FLUIDS	33	34	36	54	68	61	57	68	49
WG Gas Analysis During Factory Tests	36	36	72				57	72	50
SC INSULATION LIFE	71	61	81	91	71	138	83	138	85
WG Guides for Loading	47	44	51	62	74	70	69	74	60
TF Loss of Insulation Life		12	32	18	25	0	0	32	15
WG Thermal Eval. of Distr. and Power Transf.	44	67	56	35	40	32	38	67	45
WG Thermal Tests	20	22	30	54	48	32	34	54	34
WG High Temperature Insulation			46	33	59	60	55	60	51
SC PERFORMANCE CHARACTERISTICS	67	77	77	85	86	69	60	86	74
WG Failure Analysis Guide	50	33	42	31	28	38	20	50	37
WG Loss Tolerance and Measurement	31	24	35	37	26	38	39	39	33
TF Loss Measurement Guide		24						24	24
TF Low Power Factor Measurements									
WG LTC Performance Requirements	35	28	31	30	25	37	38	38	32
WG Qualification of Class 1E Nuclear Tr.	5	10	6	4	0	0	0	10	4
WG Revision C57.109					26	19	13	26	19
WG Revision C57.110							38	38	38
WG Semi-Conductor Rectifier Transformers	19	17	0	23	30	23	31	31	20

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IEEE/PES TRANSFORMERS COMMITTEE ATTENDANCE STATISTICS

GROUP	Denver Mar. 1990	Montreal Oct. 1990	Phoenix May 1991	Baltimore Nov. 1991	Birmingham Apr. 1992	Cleveland Oct. 1992	Portland Mar. 1993	MAX	AVG
SC UNDERGROUND TRANSFS. AND NETWORK PROTECTORS				25	21	17	17	25	20
WG Three–Phase Underground Transfs.				19	16	14	9	19	15
WG Liquid–Filled Sec. Network Transfs.				19	21	17	16	21	18
WG Secondary Network Protectors				17	16	19	13	19	16
WG Dry–Type Network Transfs.				31	29	15	18	31	23
SC WEST COAST	20	0	18	0	10	14	0	20	9
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

NOTE: Data maintained for four years only.

*=estimated

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								CHANGES CONSOLIDATED
VARIOUS	(STANDARDS)	W. B. BINDER			03/20/87	/ /	1994	(216)384-5625	EXTENDED UNTIL DEC 1994
C57.12.00	TRANSFORMER LOSS MEASUREMENT AND TOLERANCES (P787,P462)								APPROVED BY SB 09/16/92
PC57.12.00c	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	HENNING W. R.		/ /	06/28/79	1997	(301)597-6775	INCLUDE IN 1992 REVISION
C57.12.00	REVISION OF SECTION 5.9 REFERENCE TEMP FOR NO-LOAD LOSS								APPROVED BY SB 09/16/92
PC57.12.00c1	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	HENNING W. R.		/ /	06/28/79	1997	(301)597-6775	INCLUDE IN 1992 REVISION
C57.12.00	ADD TO SEC 9.3.1 ACCURACY REQUIREMENT FOR MEASURED LOSSES								APPROVED BY SB 09/16/92
PC57.12.00c2	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	HENNING W. R.		/ /	06/28/79	1997	(301)597-6775	INCLUDE IN 1992 REVISION
C57.12.00	LTC TAP POSITION INDICATION			NONE					APPROVED BY SB 09/16/92
PC57.12.00h	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	FRAZER R. H.		/ /	09/28/86	1997	(301)597-6775	INCLUDE IN 1992 REVISION
C57.12.00	NAMEPLATE INFORMATION CHANGE DIRECTED VS NON-DIRECTED FLOW			TBA					APPROVED BY SB 09/16/92
PC57.12.00i	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	MATTHEWS J. W.		/ /	12/28/86	1997	(301)597-6775	INCLUDE IN 1992 REVISION
C57.12.00	NEW SEC 6.8 MINIMUM EXTERNAL CLEARANCES BETWEEN LIVE PARTS								APPROVED BY SB 09/16/92
PC57.12.00j	DIELECTRIC TESTS	J. B. TEMPLETON	VEITCH R. A.		/ /	12/28/86	1997	(317)289-1211	INCLUDE IN 1992 REVISION
C57.12.00	TABLE 16-C ROUTINE DIST TR RESISTANCE TEST								APPROVED BY SB 09/16/92
PC57.12.00k	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	McMILLEN C. J.		/ /	03/28/87	1997	(301)597-6775	INCLUDE IN 1992 REVISION
C57.12.00	DEFINITION OF THERMAL DUPLICATE			EM IAS					CONDUCTING SURVEY
PC57.12.00l	INSULATION LIFE	D. H. DOUGLAS	GRUBB R. L.		/ /	05/31/90	1997	(216)447-3370	
C57.12.01	GENERAL REQUIREMENTS FOR DRY-TYPE DIST. AND POWER TR INCL THOSE WITH SOLID CAST &/or RESIN-ENCAPSULATED WINDINGS								
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON			02/02/89	/ /	1994	(703)688-3325	APP. BY SB 02/02/89
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	L. A. TAUBER	GILLIES D. A.		05/09/80	/ /	1992	(503)326-2323	LIFE EXTENSION TO 12/92 99%

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
C57.12.12	GUIDE FOR INSTALLATION OF OIL-IMMERSED TRANSFORMERS 345kV AND ABOVE							TO BE REPLACED BY C57.93
PC57.93	WEST COAST	L. A. TAUBER	GILLIES D. A.	05/09/80	/ /	1992	(503)326-2323	LIFE EXTENSION TO 12/92 99%
C57.12.13	CONFORMANCE REQUIREMENTS FOR LIQUID-FILLED TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS							TRANSFERRED TO IEEE
NONE	(STANDARDS)	G. VAILLANCOURT		09/02/81	/ /	1987	(514)652-8515	NEEDS A HOME
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	J. C. THOMPSON	THOMPSON J. C.	01/11/88	12/05/91	1993	(704)373-5139	NESCON REQUEST SCC14 COORD.
C57.12.21	STANDARD REQUIREMENTS FOR PAD-MOUNTED, COMPARTMENTAL-TYPE, SELF-COOLED, SINGLE-PHASE DIST TRANSFORMERS WITH HV BUSHINGS	T&D	IAS/REP					PAR APPROVED BY SB 06/27/91
PC57.12.21	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	GHAFOURIAN A.	10/22/79	06/27/91	1985	(704)373-5139	BEING REVISED IN TC
C57.12.22	PAD-MOUNTED,COMPARTMENTAL-TYPE SELF-COOLED,3-PHASE DIST. TR WITH HV BUSHINGS,2500kVA AND SNALLER:...REQUIREMENTS.	T&D	IAS/REP IAS/PSE					PAR APPROVED BY STD BOARD
PC57.12.22	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	HANUS K.	05/10/89	06/27/91	1994	(704)373-5139	PLAN TO COMPLETE IN 1992
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					PAR APPROVED BY STD BOARD
PC57.12.23	DISTRIBUTION TRANSFORMERS	J. C. THOMSON	PAIVA G.	09/19/85	06/27/91	1996	(704)373-5139	HELD FROM DIST. UNTIL BAL.C57
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					BEING BALLOTTED IN TC
PC57.12.24	UG TR & NETWORK PROTECTORS	P. E. OREHEK	HOWARD J. W.	05/10/88	06/27/91	1993	(201)430-7743	NOW TRANSFERRED TO IEEE
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					PAR APPROVED BY STD. BOARD
PC57.12.25	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	MOHESKY N.	05/11/90	06/27/91	1995	(704)373-5139	NEMA SECRETARIAT
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					REV. APP. BY SB 06/17/92
PC57.12.26	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	PAIVA G.	04/16/86	12/05/91	1997	(704)373-5139	BEING BALLOTED IN C57
C57.12.27	CONFORMANCE REQUIREMENTS FOR LIQUID-FILLED DISTRIBUTION TR USED IN PAD-MOUNTED INSTALLATIONS, INCL. UNIT SUBSTATIONS	T&D	IAS/REP IAS/PSE					DOCUMENT NOT USED BY INDUSTRY

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
PC57.12.27	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	LYONS J.	09/02/81	06/27/91	1987	(704)373-5139	W.G. RECOMMENDS WITHDRAW STD
C57.12.28	PAD-MOUNTED EQUIPMENT - ENCLOSURE INTEGRITY							PAR TO BE SUBMITTED
PC57.12.28	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	MARTIN J.	06/24/87	/ /	1993	(704)373-5139	NOT TRANSFERED TO TC YET
C57.12.29	PAD-MOUNTED EQUIPMENT - ENCLOSURE INTEGRITY IN COASTAL ENVIRONMENTS							APPROVED BY SUBCOMMITTEE
PC57.12.29	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	MARTIN J.	/ /	/ /	1996	(704)373-5139	NOT TRANSFERED TO TC YET
C57.12.30	SUBMERSIBLE EQUIPMENT - ENCLOSURE INTEGRITY							PAR TO BE SUBMITTED
PC57.12.30	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	MARTIN J.	/ /	/ /	1993	(704)373-5139	NOT TRANSFERED TO TC YET
C57.12.31	COATING STANDARD FOR POLE MOUNTED TRANSFORMERS							PAR TO BE SUBMITTED
PC57.12.31	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	MARTIN J.	/ /	/ /	0	(704)373-5139	NOT TRANSFERED TO TC YET
C57.12.40	REQUIREMENTS FOR SECONDARY NETWORK TRANSFORMERS, SUBWAY & VAULT TYPES (LIQUID IMMERSED)			SCC14				BALLOTING REVISION IN TC
PC57.12.40	UG TR & NETWORK PROTECTORS	P. E. OREHEK	BERTOLINI E. A.	05/18/90	12/05/91	1995	(201)430-7743	NOW TRANSFERRED TO IEEE
C57.12.44	STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS			T&D	SWGR	IAS/REP	IAS/PSE EEI	PAR APPROVED BY SB 06/17/92
PC57.12.44	UG TR & NETWORK PROTECTORS	P. E. OREHEK	ROBERTSON R. B.	/ /	06/27/91	0	(201)430-7743	
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							NOW TRANSFERRED TO IEEE
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON		08/15/80	/ /	1994	(703)688-3325	REAFFIRMED 06/12/89
C57.12.51	REQ. FOR VENTILATED DRY-TYPE POWER TR, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V, LV 208Y/120 TO 4160 VOLTS							NOW TRANSFERRED TO IEEE
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON		12/22/80	/ /	1994	(703)688-3325	REAFFIRM 06/12/89
C57.12.52	REQ. FOR SEALED DRY-TYPE POWER TRANSFORMERS, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V,LV 208Y/120 TO 4160 VOLTS							NOW TRANSFERRED TO IEEE
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON		12/22/80	/ /	1994	(703)688-3325	REAFFIRMED 06/12/89
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
NONE	(STANDARDS)	G. VAILLANCOURT		/ /	/ /	0	(514)652-8515	NOBODY IS WORKING ON IT

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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
NONE	(STANDARDS)	G. VAILLANCOURT		/ /	/ /	0	(514)652-8515	
C57.12.55	CONFORMANCE STANDARD FOR TR- DRY-TYPE TRANSFORMERS USED IN UNIT INSTALLATIONS, INCL. UNIT SUBSTATIONS							NOW TRANSFERRED TO IEEE
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON		04/07/86	/ /	1992	(703)688-3325	BALLOT REAFFIRMATION
C57.12.56	TEST PROCEDURE FOR THERMAL EVALUATION OF INSULATION SYST FOR VENTILATED DRY-TYPE POWER & DISTRIBUTION TRANSFORMERS							BALLOTTING REAFFIRMATION IN TC
PC57.12.56	DRY-TYPE TRANSFORMERS	W. PATTERSON	PROVOST R. L.	08/27/84	/ /	1991	(703)688-3325	EXTENDED TO MARCH 95
C57.12.57	REQUIREMENTS FOR VENTILATED DRY-TYPE NETWORK TRANSFORMERS 2500kVA AND BELOW, W/HV 34500V AND BELOW,LV 216Y..AND 480Y..			T&D	EEI/T&D SCC14			NOW TRANSFERRED TO IEEE
PC57.12.57	UG TR & NETWORK PROTECTORS	P. E. OREHEK	NUTT B.	08/15/86	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.	/ /	06/28/78	1996	(703)688-3325	ANSI APPROVED 10/11/91
C57.12.59	GUIDE FOR DRY-TYPE TRANSFORMER THROUGH-FAULT CURRENT DURATION							
NONE	DRY-TYPE TRANSFORMERS	W. PATTERSON	NONE	01/01/89	09/13/84	1996	(703)688-3325	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.	/ /	08/17/89	1994	(703)688-3325	BEING BALLOTTED IN C57
C57.12.70	TERMINAL MARKINGS AND CONNECTIONS FOR DIST. & POWER TRANSFORMERS							BEING BALLOTED IN C57
NONE	(STANDARDS)	G. VAILLANCOURT		12/17/86	/ /	1997	(514)652-8515	REAF BY SB ON 06/17/92
C57.12.80	TERMINOLOGY FOR POWER & DISTRIBUTION TRANSFORMERS							REAFFIRMED 05/01/92
NONE	(STANDARDS)	G. VAILLANCOURT		12/17/86	/ /	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							REV APPROVED BY SB 03/16/93
VARIOUS	(STANDARDS)	G. VAILLANCOURT		03/18/87	/ /	1998	(514)652-8515	BEING SENT TO ANSI C57

ATTACHMENT 2

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
C57.12.90 NONE	SECTION 7.3 FIGURES 9 & 10 REVERSED PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS		/ /	/ /	0	(301)597-6775	READY INCLUDED IN 1993 REVISION
C57.12.90 PC57.12.90b	TRANSFORMER SOUND POWER MEASUREMENT AUDIBLE SOUND & VIBRATION	A. M. TEPLITSKY	TEPLITSKY A. M.	EM NEMA SUB / /	03/01/86	1998	(212)460-4859	INCLUDED IN 1993 REVISION
C57.12.90 PC57.12.90c	ROUTINE IMPULSE TESTS FOR DISTRIBUTION TRANSFORMERS DIELECTRIC TESTS	J. B. TEMPLETON	ROSSETTI J.	RMC PSC / /	09/10/87	1998	(317)289-1211	INCLUDED IN 1992 REVISION
C57.12.90 PC57.12.90d	ENHANCEMENT VOLTAGE TIME DURATION DURING POWER TRANS. INDUCED TESTS DIELECTRIC TESTS	J. B. TEMPLETON	TEMPLETON J. B.	/ /	09/28/90	0	(317)289-1211	DRAFT 1 BEING PREPARED NEW WORKING GP TO WORK ON THIS
C57.12.90 PC57.12.90e	REVISION TO SEC 9 IMPEDANCE AND LOAD LOSSES PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	HENNING W. R.	/ /	06/28/79	1998	(301)597-6775	INCLUDED IN 1993 REVISION
C57.12.90 PC57.12.90e3	REVISION TO SEC 8 NO-LOAD LOSSES & EXCITATION CURRENT PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	HENNING W. R.	/ /	06/28/79	1998	(301)597-6775	INCLUDED IN 1993 REVISION
C57.12.91 PC57.12.91	TEST CODE FOR DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS DRY-TYPE TRANSFORMERS	W. PATTERSON	BARNARD D.	SPD EM 11/29/78	06/01/89	1984	(703)688-3325	BALLOTING REAFFIRMATION WORKING ON REVISION(D5 COMING)
C57.13 P546	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS INSTRUMENT TRANSFORMERS	J. N. DAVIS		PSIM PSR SPD 03/30/78	05/29/80	1992	(404)393-9831	COMPLETE COORDINATION AND RESUBMIT TO SB
C57.13.1 NONE	GUIDE FOR FIELD TESTING OF RELAYING CURRENT TRANSFORMERS INSTRUMENT TRANSFORMERS	J. N. DAVIS		08/25/87	/ /	1992		APPROVED BY ANSI 12/02/92 REAFFIRMED 03/18/92
C57.13.2 NONE	CONFORMANCE TEST PROCEDURES FOR INSTRUMENT TRANSFORMERS INSTRUMENT TRANSFORMERS	J. N. DAVIS		04/16/86	09/26/91	1996	(404)447-7386	PUBLISHED 1992 RECOGNIZED BY ANSI 12/23/92
C57.13.3 NONE	GUIDE FOR THE GROUNDING OF INSTRUMENT TR SECONDARY CICUITS AND CASES INSTRUMENT TRANSFORMERS	J. N. DAVIS		01/23/87	/ /	1991		TRANSFER FROM PSRC COMMITTEE
C57.13.4 P832	DETECTION OF PARTIAL DISCHARGE AND MEASUREMENT OF APPARENT CHARGE WITHIN INSTRUMENT TRANSFORMERS INSTRUMENT TRANSFORMERS	J. N. DAVIS	JONNATTI A. J.	T&D / /	05/28/80	0	(404)447-7386	D6 BEING BALLOTTED IN TC RESOLVING 3 NEGATIVES

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C57.15	REQUIREMENTS, TERMINOLOGY, & TEST CODE FOR STEP-VOLTAGE AND INDUCTION VOLTAGE REGULATORS							REAFFIRMED 05/01/92
NONE	(STANDARDS)	G. VAILLANCOURT		03/18/87	06/19/86	1997	(514)652-8515	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	(703)688-3325	NEW PROJECT
C57.17	REQUIREMENTS FOR ARC FURNACE TRANSFORMERS							LAST REVISED IN 1986
NONE	(STANDARDS)	G. VAILLANCOURT		/ /	/ /	1986	(514)652-8515	ANSI DOCUMENT
C57.18.10	REQUIREMENTS FOR SEMICONDUCTOR RECTIFIER TRANSFORMERS			NONE				BALLOTTING WG, ONLY 47% RET.
PC57.18.10	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	KENNEDY S. P.	/ /	12/28/81	0	(301)597-6775	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 PRIT	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				RESOLVING BALLOT COMMENTS
P800	BUSHING	L. B. WAGENAAR	ELLIOTT F. E.	/ /	09/27/79	0	(614)223-2259	
C57.19.101	GUIDE FOR LOADING POWER APPARATUS BUSHINGS							APPROVED AS FULL-USE 06/17/92
P757	BUSHING	L. B. WAGENAAR	ELLIOTT F. E.	10/20/88	/ /	1997	(614)223-2259	BEING BALLOTED IN C57
C57.21	REQUIREMENTS,TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA			EM T&D PSR				COMPLETE
PC57.21	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	McGILL J. W.	04/02/91	06/09/88	1995	(301)597-6775	ANSI APPROVED 08/09/91
C57.21	REQUIREMENTS TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA							COMPLETE

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
PC57.21	DRY-TYPE TRANSFORMERS	W. PATTERSON	DUDLEY R.	04/02/91	/ /	1995	(703)688-3325	ANSI APPROVED 08/09/91
C57.21 PC57.21a	REQUIREMENTS,TERMINOLOGY AND TEST CODE FOR SH. REACTORS OVER 500kVA DIELECTRIC TESTS	J. B. TEMPLETON	KENNEDY W. N.	NONE 04/02/91	12/11/86	1995	(317)289-1211	COMPLETE ANSI APPROVED 08/09/91
C57.91 PC57.91	GUIDE FOR LOADING MINERAL OIL-INMERSED TRANSFORMERS INSULATION LIFE	D. H. DOUGLAS	PIERCE L.	SUB T&D PSE 03/21/91	06/13/85	1997	(216)447-3370	PUB. 1/12/81, REAFFIRMED 1991 APPROVED BY ANSI 01/13/92
C57.92 PC57.91	GUIDE FOR LOADING MINERAL OIL-INMERSED POWER TRANSFORMERS UP TO & INCL 100 MVA WITH 55 C OR 65 C AVE. WINDING RISE INSULATION LIFE	D. H. DOUGLAS	PIERCE L.	T&D SUB PSE 03/21/91	06/28/85	1997	(216)447-3370	PUB. 1/12/81, REAFFIRMED 1991 TO BE COMBINED INTO C57.91
C57.93 PC57.93	GUIDE FOR INSTALLATION OF LIQUID-INMERSED POWER TRANSFORMERS. WEST COAST	L. A. TAUBER	GILLIES D. A.	NONE / /	06/01/89	0	(503)326-2323	BALLOTING REVISION IN TC WITHDRAW 12.11/12.12 WHEN APP.
C57.94 NONE	RECOMMENDED PRACTICE FOR INSTALLATION, APPLICATION,OPERATION & MAINTENANCE OF DRY-TYPE GEN PURPOSE DIST & POWER TR DRY-TYPE TRANSFORMERS	W. PATTERSON		12/09/87	/ /	1987	(703)688-3325	PUB. 1982, REAFFIRMED 1987 BALLOTTING REAFFIRMATION
C57.95 NONE	GUIDE FOR LOADING LIQUID-IMMERSED STEP-VOLTAGE AND INDUCTION-VOLTAGE REGULATORS INSULATION LIFE	D. H. DOUGLAS	TAKACH D. S.	03/21/91	/ /	1997	(216)447-3370	PUB. 08/19/85, REAFFIRMED 1991 ANSI APPROVED 01/13/92
C57.96 NONE	GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS DRY-TYPE TRANSFORMERS	W. PATTERSON	MUTSCHLER W. H.	SCC14 04/26/89	04/26/89	1994	(703)688-3325	
C57.96 PC57.96	GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS DRY-TYPE TRANSFORMERS	W. PATTERSON	PIERCE L.	T&D SCC14 SCC10 04/26/89	05/06/91	1994	(703)688-3325	INCORP CAST COIL IN C57.96 COMPLETE BY 10/93
C57.98 NEW	ROUTINE TEST GUIDE FOR DISTRIBUTION TRANSFORMERS DIELECTRIC TESTS	J. B. TEMPLETON	ROSSETTI J.	T&D PSIM / /	09/25/91	0	(317)289-1211	SUBMITTED PAR TO STD BOARD
C57.98 PC57.98	IEEE GUIDE FOR TRANSFORMER IMPULSE TESTS DIELECTRIC TESTS	J. B. TEMPLETON	TEMPLETON J. B.	NONE 06/01/86	02/01/86	1992	(317)289-1211	APPROVED BY ANSI 12/02/92 REAFFIRMED 03/18/92
C57.99 P731	GUIDE FOR LOADING DRY-TYPE AND OIL-IMMERSED CURRENT-LIMITING REACTORS (STANDARDS)	G. VAILLANCOURT		/ /	03/28/78	1990	(514)652-8515	NEEDS REVISION

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C57.100	TEST PROCEDURE FOR THERMAL EVALUATION OF OIL-IMMERSED DISTRIBUTION TRANSFORMERS			NPE EM T&D SPD				APPROVED BY ANSI 12/02/92
PC57.100	INSULATION LIFE	D. H. DOUGLAS	LOWDERMILK L. A.	08/19/85	10/20/88	1997	(216)447-3370	REAFFIRMED 03/18/92
C57.104	GUIDE FOR THE DETECTION AND DETERMINATION OF GENERATED GAS IN OIL-IMMERSED TRANSFORMERS & THEIR RELATION TO SERVICEABIL.			PSR T&D				STARTED REVISING
PC57.104	INSULATING FLUIDS	H. A. PEARCE	HEINRICHS F. W.	06/07/92	05/31/90	1996	(412)983-4335	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	J. W. MATTHEWS	REITTER G.	06/11/78	/ /	1997	(301)597-6775	BEING BALLOTED IN C57
C57.106	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF INSULATING OIL IN EQUIPMENT			NONE				PUBLISHED 1992
PC57.106	INSULATING FLUIDS	H. A. PEARCE		06/16/92	06/19/86	1996	(412)983-4335	ANSI APPROVED 11/20/91
C57.109	GUIDE FOR THROUGH-FAULT CURRENT DURATION			PSR				WILL BALLOT C57
PC57.109	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	PATEL B. K.	08/19/85	06/27/91	1998	(301)597-6775	REV. APPROVED BY SB 03/16/93
C57.110	RECOMMENDED PRACTICE FOR ESTABLISHING TRANSFORMER CAPABILITY WHEN SUPPLYING NONSINUSOIDAL LOAD CURRENTS							REAFFIRMED 12/03/92
PC57.110	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	MAREK R. P.	08/21/87	/ /	1997	(301)597-6775	
C57.111	GUIDE FOR ACCEPTANCE OF SILICONE INSULATING FLUID AND ITS MAINTENANCE IN TRANSFORMERS			IAS T&D ED&PG IEC				PUBLISHED
NONE	INSULATING FLUIDS	H. A. PEARCE		02/02/89	12/10/87	1994	(412)983-4295	NOT AN ANSI STANDARD
C57.112	GUIDE FOR THE CONTROL OF TRANSFORMER SOUND			NONE				NEW TASK FORCE TO START WORK
P523	AUDIBLE SOUND & VIBRATION	A. M. TEPLITSKY	TEPLITSKY A. M.	/ /	12/28/73	0	(212)460-4859	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.	07/02/92	09/25/91	1996	(317)289-1211	
C57.114	SEISMIC GUIDE FOR POWER TRANSFORMERS AND REACTORS			NPE SUBS.				APP BY SB 02/15/90
P513	WEST COAST	L. A. TAUBER	OKLU S.	02/15/90	09/06/73	1996	(503)326-2323	ANSI APPROVED 08/09/91

ATTACHMENT 2

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
C57.115	GUIDE FOR LOADING MINERAL-OIL-IMMERSED POWER TRANSFORMERS RATED IN EXCESS OF 100MVA (65 C WINDING RISE)							BEING REVISED
P756	INSULATION LIFE	D. H. DOUGLAS	TAKACH D. S.	03/21/91	/ /	1996	(216)447-3370	ANSI APPROVED 01/13/92
C57.116	GUIDE FOR TRANSFORMERS DIRECTLTY CONNECTED TO GENERATORS							APPROVED BY SB 01/03/89
NONE	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	PATEL B. K.	01/03/89	/ /	1994	(301)597-6775	NOTHING OUTSTANDING
C57.117	GUIDE FOR REPORTING FAILURE DATA FOR POWER TRANSFORMERS AND SHUNT REACTORS							REAFFIRMED BY SB 06/17/92
P786	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	ALTMAN M.	08/21/87	/ /	1997	(301)597-6775	BEING BALLOTED IN C57
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
PC57.119	INSULATION LIFE	D. H. DOUGLAS	GRUBB R. L.	/ /	09/17/92	0	(216)447-3370	REVISING PAR (TITLE & SCOPE)
C57.120	LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS	SUB	EM	ED&PG	IAS	IEC		PUBLISHED 1992
P842	WEST COAST	L. A. TAUBER	JACOBSEN R.	06/06/92	05/01/80	1997	(503)326-2323	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			ANSI APPROVED 08/09/91
P954	INSULATING FLUIDS	H. A. PEARCE		02/22/88	04/12/82	1996	(412)983-4295	
C57.123	GUIDE FOR TRANSFORMER LOSS MEASUREMENT							TF WORKING
P1098	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	HENNING W. R.	/ /	06/13/85	0	(301)597-6775	
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.	06/06/92	06/27/91	1996	(703)688-3325	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	SWGR			APPROVED BY STD BOARD 6/26/91
PC57.125	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	ALTMAN M.	/ /	06/28/87	1996	(301)597-6775	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

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
C57.128	FIRE PROTECTION OF OUTDOOR LIQUID-IMMERSED POWER TRANSFORMERS			NPE	SUB	PSR		DRAFT BEING PREPARED
PC57.128	WEST COAST	L. A. TAUBER	SUNDIN D.	/ /	06/01/89	0	(503)326-2323	
C57.129	GENERAL REQUIREMENTS & TEST CODE FOR OIL-IMMERSED HVDC CONVERTER TRANSFORMERS AND SMOOTHING REACTORS FOR DC POWER TRANSM			EM	T&D	PSIM	SUB	REVISED PARS TO STD BOARD
PC57.129	HVDC CONVERTER TR & REACTOR	W. N. KENNEDY	KENNEDY W. N.	/ /	09/26/91	0	(317)286-9387	BALLOTING IN SUBCOMMITTEE
C57.130	GUIDE FOR USE OF DISSOLVED GAZ ANALYSIS DURING FACTORY THERMAL TESTSFOR THE EVALUATION OF OIL-IMMERSED TRANS. AND REACT.			NONE				NEW PAR APP. BY SB 03/17/93
PC57.130	INSULATING FLUIDS	H. A. PEARCE	KINNEY J. P.	/ /	03/17/93	0	(412)983-4295	CHANGE IN TITLE AND SCOPE
C57.131	REQUIREMENTS FOR LOAD TAP CHANGERS			EM	T&D			SC BALLOT COMPLETED
PC57.131	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	TRAUB T. P.	/ /	08/17/89	0	(301)597-6775	
IEEE 637	GUIDE FOR THE RECLAMATION OF INSULATING OIL AND CRITERIA FOR ITS USE							REAFFIRMED 03/18/92
P637	INSULATING FLUIDS	H. A. PEARCE		06/04/84	/ /	1997	(412)983-4335	
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	J. W. MATTHEWS	PIERCE L. W.	/ /	10/29/90	1997	(301)597-6775	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	H. A. PEARCE		11/17/86	09/27/79	1997	(412)983-4295	
IEEE1258	GUIDE FOR INTERPRETATION OF GASES IN SILICONE LIQUID-FILLED TRANSFORMERS			T&D	SCC14			PAR APPROVED BY SB 12/05/91
P1258	INSULATING FLUIDS	H. A. PEARCE	GOUDIE JIM	/ /	12/05/91	0	(412)983-4295	SURVEY CONDUCTED
IEEE1265	STANDARD FOR BAR CODING FOR DISTRIBUTION TRANSFORMERS (POLE-MOUNTED, PAD-MOUNTED AND UNDERGROUND)			AIM/TSC	IAS/REP			PAR APPROVED 06/27/91
P1265	DISTRIBUTION TRANSFORMERS	J. C. THOMPSON	JORDAN RON	/ /	06/27/91	0	(704)373-5139	
IEEE1276	TRIAL-USE GENERAL REQUIREMENTS FOR LIQUID-FILLED DISTRIBUTION AND POWER TR UTILIZING HIGH TEMP SOLID INSULATING MATERIAL			T&D				SUBMITTING PAR
P1276	INSULATION LIFE	D. H. DOUGLAS	FISCHER H.	/ /	09/25/91	0	(216)447-3370	WILL CONDUCT SURVEY ON HI-T M.
IEEE1277	GENERAL REQUIREMENTS & TEST CODE FOR OIL-IMMERSED AND DRY-TYPE HVDC SMOOTHING REACTORS			SUB				FIRST TF MEETING TOOK PLACE

STATUS REPORT ON STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE

ATTACHMENT 2

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
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				PAR APPROVED BY SB 03/17/93
P1350	DIELECTRIC TESTS	J. B. TEMPLETON	ROSSETTI J.	/ /	03/17/93	0	(317)289-1211	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	DIELECTRIC TESTS	J. B. TEMPLETON	HOWELLS E.	/ /	/ /	0	(317)289-1211	SUBMIT PAR AS SOON AS POSSIBLE

03/24/93

COORDINATION ACTIVITY OF IEEE/PES TRANSFORMERS COMMITTEE
LIST OF LIAISON REPRESENTATIVES
ATTACHMENT 3

ACRONYM	SOCIETY/COMMITTEE	LIAISON REPRESENTATIVE	PHONE NUMBER
AIM/TSC	AUTOMATIC IDENTIFICATION MANUFACTURERS (TSC COMM.)		
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) 580-6675
PSIM	POWER SYSTEM INSTRUMENTATION MEASUREMENT COMMITTEE	T. R. MC COMB	(613) 990-5826
PSRC	POWER SYSTEM RELAYING COMMITTEE	A. G. PHADKE	(703) 231-7029
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) 335-2361
SUBS	SUBSTATIONS COMMITTEE	J. E. HOLLADAY	(615) 689-5781
SWGR	SWITCHGEAR COMMITTEE	R. SAAVEDRA	(504) 830-6052
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

COORDINATION ACTIVITIES OF THE IEEE/PES TRANSFORMERS COMMITTEE

ATTACHMENT 4

*PROJECT NO. TITLE DATE	PES COMMITTEE	CONTACT IN PES COM.	CONTACT PHONE NO.	TRANSFORMERS COMMITTEE COORDINATOR	TRANSFORMERS COMMITTEE SUBCOMMITTEE	COORDINATOR PHONE NO.
*PC37.107 STANDARD FOR DIGITAL PROTECTION SYSTEM DESIGN 12/28/85	PSR	STIG L. NILSSON	415-855-2314	UNKNOWN, PLEASE IDENTIFY		
*PC37.108 GUIDE FOR THE PROTECTION OF NETWORK TRANSFORMERS / /	PSR	THOMAS E. WIEDMAN	312-294-2810	UNKNOWN, PLEASE IDENTIFY		
*PC37.109 GUIDE FOR THE PROTECTION OF SHUNT REACTORS / /	PSR	LAVERN L. DVORAK	303-231-1636	UNKNOWN, PLEASE IDENTIFY		
*PC62.2.01 APPLICATION GUIDE FOR SURGE PROTECTION OF ELECTRIC GENERATING PLANTS 06/01/84	SPD	G. L. GAIBROIS	313-897-0485	G. W. ILIFF		
*PC62.11 STANDARD FOR METAL-OXIDE SURGE ARRESTERS FOR AC POWER CIRCUITS / /	SPD	R. M. SIMPSON	919-836-7059	UNKNOWN, PLEASE IDENTIFY		
*P656 STANDARD FOR THE MEASUREMENT OF AUDIBLE NOISE FROM OVERHEAD TRANSMISSION LINES 03/08/91	T&D	JAMES R. STEWART	518-395-5025	ALAN M. TEPLITSKY	AUDIBLE SOUND AND VIBRATION	212-460-4859
*P957 GUIDE FOR CLEANING INSULATORS 04/01/92	T&D	WILLIAM L. GIBSON	415-973-3747	L. B. WAGENAAR	BUSHING	614-223-2259
*PC37.04h MECHANICAL LOADING REQUIREMENTS OF CIRCUIT BREAKER TERMINALS 01/07/91	SWGR	GEORGE R. HANKS	615-751-4020	LOREN B. WAGENAAR	BUSHINGS	614-223-2259
*P1038 STANDARD TEST SPECIFICATION FOR SURGE PROTECTIVE DEVICES FOR LOW VOLTAGE AC POWER CIRCUITS 12/03/90	SPD	LEWIS DOUGLAS SWEENEY	602-834-9372	MAHESH P. SAMPAT	DIELECTRIC TESTS	704-462-3226
*PC62.42 GUIDE FOR THE APPLICATION OF LOW-VOLTAGE SURGE PROTECTIVE DEVICES 01/21/91	SPD	MICHEAL M. FLACK	404-551-4904	MAHESH P. SAMPAT	DIELECTRIC TESTS	704-462-3226
*P1223 POWER SYSTEM DIGITAL TESTING TECHNIQUES / /	PSIM	T. R. McCOMB	613-990-5826	R. MINKWITZ, SR.	DIELECTRIC TESTS	617-828-3241
*PC62.22 GUIDE FOR APPLICATION OF METAL OXIDE SURGE ARRESTERS FOR AC SYSTEMS / /	SPD	S. S. KERSHAW	716-375-7296	L. B. WAGENAAR	DIELECTRIC TESTS	614-223-2259